

0250/020/002  
1939  
H

PUBLICATION 663

FARMERS' BULLETIN 83

ISSUED DECEMBER, 1939

FIRST PRINTING

DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

# VEGETABLES FOR PRAIRIE FARMS

by

W. R. LESLIE

Superintendent

AND

W. GODFREY

Head Gardener

EXPERIMENTAL STATION, MORDEN, MAN.

NOV 12 1993

DIVISION OF HORTICULTURE

EXPERIMENTAL FARMS SERVICE

LIBRARY, ALBERTA AGRICULTURE  
7000 - 113 STREET, EDMONTON  
ALBERTA, CANADA  
T6H 5T6



Published by authority of the Hon. JAMES G. GARDINER, Minister of Agriculture,  
Ottawa, Canada

# DOMINION EXPERIMENTAL FARMS SERVICE

## PERSONNEL

DIRECTOR, E. S. ARCHIBALD, B.A., B.S.A., LL.D., D.Sc.

ASSOCIATE DIRECTOR, E. S. HOPKINS, B.S.A., M.S., Ph.D.

Dominion Field Husbandman..... E. S. Hopkins, Ph.D., (Acting)  
Dominion Horticulturist ..... M. B. Davis, B.S.A., M.Sc.  
Dominion Cerealist..... L. H. Newman, B.S.A., D.Sc.  
Dominion Animal Husbandman ..... G. W. Muir, B.S.A.  
Dominion Agrostologist..... T. M. Stevenson, Ph.D.  
Dominion Poultry Husbandman..... George Robertson.  
Chief, Tobacco Division..... N. T. Nelson, B.S.A., M.S., Ph.D.  
Dominion Apiarist..... C. B. Gooderham, B.S.A.  
Chief Supervisor of Illustration Stations..... J. C. Moynan, B.S.A.  
Economic Fibre Specialist..... R. J. Hutchinson.

## ALBERTA

Superintendent, Experimental Station, Lacombe, Alta., F. H. Reed, B.S.A.  
Superintendent, Experimental Station, Lethbridge, Alta., W. H. Fairfield, M.Sc., LL.D.  
Superintendent, Experimental Sub-station, Beaverlodge, Alta., W. D. Albright.  
Officer in Charge, Experimental Sub-station, Fort Vermilion, Alta., Albert Lawrence.  
Officer in Charge, Don. Range Experiment Station, Manyberries, Alta., H. J. Hargrave, B.S.A.

## BRITISH COLUMBIA

Superintendent, Experimental Farm, Agassiz, B.C., W. H. Hicks, B.S.A.  
Superintendent, Experimental Station, Summerland, B.C., R. C. Palmer, M.S.A.  
Superintendent, Experimental Station, Windermere, B.C., R. G. Newton, B.S.A.  
Superintendent, Experimental Station, Sidney, B.C., E. M. Straight, B.S.A.  
Officer in Charge, Experimental Sub-station, Smithers, B.C., K. MacBean, B.S.A.

## MANITOBA

Superintendent, Experimental Farm, Brandon, Man., M. J. Tinline, B.S.A.  
Superintendent, Experimental Station, Morden, Man., W. R. Leslie, B.S.A.

## SASKATCHEWAN

Superintendent, Experimental Farm, Indian Head, Sask., W. H. Gibson, B.S.A.  
Superintendent, Experimental Station, Rosthern, Sask., F. V. Hutton, B.S.A.  
Superintendent, Experimental Station, Scott, Sask., G. D. Matthews, B.S.A.  
Superintendent, Experimental Station, Swift Current, Sask., L. B. Thomson, B.Sc.  
Superintendent, Experimental Station, Melfort, Sask., M. J. McPhail, B.S.A.  
Superintendent, Forest Nursery Station, Indian Head, Sask., N. M. Ross, B.S.A., B.F.  
Superintendent, Forest Nursery Station, Sutherland, Sask., James McLean.

## NEW BRUNSWICK

Superintendent, Experimental Station, Fredericton, N.B., C. F. Bailey, B.S.A.

## NOVA SCOTIA

Superintendent, Experimental Farm, Nappan, N.S., W. W. Baird, B.S.A.  
Superintendent, Experimental Station, Kentville, N.S., A. Kelsall, B.S.A.

## PRINCE EDWARD ISLAND

Superintendent, Experimental Station, Charlottetown, P.E.I., J. A. Clark, B.S.A., D.Sc.  
Superintendent, Experimental Fox Ranch, Summerside, P.E.I., G. E. Smith, B.A.Sc., D.Sc.

## ONTARIO

Central Experimental Farm, Ottawa, Ont.  
Superintendent, Experimental Station, Kapuskasing, Ont., S. Ballantyne.  
Superintendent, Experimental Station, Harrow, Ont., H. F. Murwin, B.S.A.

## QUEBEC

Superintendent, Experimental Station, Cap Rouge, Que., C. E. Ste. Marie, B.S.A.  
Superintendent, Experimental Station, Lennoxville, Que., J. A. Ste. Marie, B.S.A.  
Superintendent Experimental Station, Ste. Anne de la Pocatière, Que.  
J. R. Pelletier, B.S.A., M.S.A.  
Superintendent, Experimental Station, Normandin, Que., A. Belzile, B.S.A.  
Superintendent, Experimental Station, Farnham, Que., R. Bordeleau, B.S.A.  
Superintendent, Experimental Station, L'Assomption, Que., J. E. Montreuil, B.S.A.  
Officer in Charge, Experimental Sub-station, Ste. Clothilde de Châteauguay, Que.,  
F. S. Browne, B.S.A.

## TABLE OF CONTENTS

	PAGE
Introduction.....	5
Origin of Garden Vegetables.....	5
Plant Families.....	7
Plant Parts.....	8
Vegetables in the Diet.....	8
Vitamins.....	9
Vegetable Improvement.....	10
Vegetable Seed Stocks.....	11
Shelter.....	11
Size and Site.....	12
Soil.....	12
Preparation of the Soil.....	13
Feeding the Soil.....	13
Manure.....	13
Green Manures.....	14
Commercial Fertilizers.....	14
The Garden Plan.....	15
Planting Table.....	16
Arrangement.....	17
Rotation of Crops.....	17
Succession Cropping.....	18
Successive Sowings.....	18
Companion Crops and Intercropping.....	18
Partnership cropping.....	18
Growing Early Plants.....	19
Hotbeds.....	19
Coldframes.....	21
Summer Use of Hotbeds and Cold Frames.....	22
Sterilization of Soil.....	24
Tools and Implements.....	24
Sowing and Transplanting.....	25
Thinning.....	25
Cultivation.....	26
Paper Mulch.....	26
Mulches.....	27
Irrigation.....	27
Harvesting.....	29
Canning.....	30
Drying.....	30
Storing.....	30
Autumn Sowing.....	32
Cellar Winter Gardens.....	32
Vegetable Exhibitions.....	33
Garden Contests.....	34
Garden Calendar.....	34
Insects and Diseases.....	37
Growing Crops.....	37
Progress.....	72
Thoughts on Dry Land Gardening.....	73

## ILLUSTRATIONS

	PAGE
Figure 1—Possible arrangement of the farmstead with snowtrap, dugout, shelterbelt, vegetable garden, alternate vegetable garden and orchard.....	6
“ 2—Vegetable garden, a suggested arrangement.....	17
“ 3—Surface hotbed.....	19
“ 4—Permanent hotbed with pit.....	19
“ 5—Cold frame.....	21
“ 6—Dugout—Dominion Experimental Station, Scott, Sask.....	28
“ 7—Irrigating vegetables, using furrows, Scott, June 30/1937.....	29
“ 8—Irrigated celery, left; celery grown under natural rainfall, right. Scott, 1938...	48
“ 9—Irrigated parsnips, left; parsnips grown under natural rainfall, right. Scott, 1938.....	59
“ 10—Sheltered garden in snowtrap area.....	61
“ 11—Spring forcing of rhubarb with an apple barrel at Morden.....	64
“ 12—Small farm greenhouse 10½ feet by 25 feet. Frame sash for roof. (Morden)....	68



## VEGETABLES FOR PRAIRIE FARMS

### Introduction

Garden is a word gaining in prominence among prairie farmers year by year. The first pioneers of the Great Plains depended upon the merchant for dried beans, peas and vegetables out of cans, growing in their own modest gardens only some leaf lettuce, radish, carrots, turnips and potatoes. In that era the redmen of the Sioux tribe were superior gardeners, growing Indian corn, squash, pumpkins, beans and some other crops secured originally from their brethren down along the Missouri river. Moreover, the natives made use of a considerable number of prairie plants in their diet such as the Indian turnip, sunflowers and lambs-quarters.

During the last generation the importance of vegetables has been increasingly realized. Fresh vegetables are healthful in supplying essential minerals, salts, particularly those of calcium, iron and phosphorus which assist in building bones, teeth and blood elements; also in their contribution of vitamins which build up body resistance to disease as well as aiding better digestion of other foods; and in the physical benefit resulting from their bulk. Vegetables are nutritious and stimulate appetite by their flavours, attractive colours and pleasing textures.

The home vegetable garden is usually the most profitable acre on the farm. It is a happy circumstance that it is now coming more into its rightful value. In it all members of the family may be partners and derive sustained good health, beneficial exercise, some adventure, products to exhibit at the local garden show, and financial profit.

This treatise on the Home Vegetable Garden succeeds Bulletin Number 43 by McKillican and Cooper. The aim is to assemble suggestions for the guidance of those with but little experience in growing vegetables. Comment is from the point of view of the farmer.

### Origin of Garden Vegetables

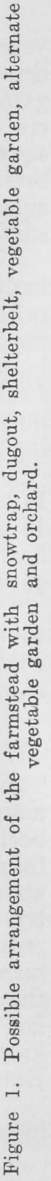
There is satisfaction in possessing some understanding of the background of materials with which we work. Most of the common garden vegetables have been cultivated since before those far off times of the dim past when the first faint records of Man and his doings took form. For example, Moses writing about 1400 B.C. refers to cucumbers, garlic, leeks, melons and onions. The tribes of Persia and India were among the earliest vegetable growers. The redmen of tropical America raised vegetables many centuries before white men appeared. So long have garden crops been cultivated that in most cases the ancestral wild prototype has disappeared from the face of the earth or is not recognized. Exceptions are the wild Jerusalem artichoke of Canada, the kidney bean of South America, wild parsnip, wild carrot, and wild cabbage of Europe.

The habitat of the wild plant forms from which modern vegetable crops have sprung are considered to be as follows:—

*North America.*—Jerusalem artichoke, sweet corn, summer squash.

*Tropical and South America.*—Bush lima bean, pole lima bean, kidney bean, scarlet runner bean, flint corn, eggplant, pepper, potato, sweet potato, pumpkin, winter squash, tomato.

*Jamaica.*—Gherkin cucumber.



*Europe.*—Beet, Swiss chard, Brussels sprouts, cabbage, celeriac, celery, kale, kohlrabi, leek, parsley, parsnip, rutabaga, salsify, turnip.

*Asia.*—Broad bean, Chinese cabbage, garden or upland cress, cucumber, endive, lettuce, muskmelon, onion, pea, radish, rhubarb, spinach.

*Europe-Asia.*—Asparagus, carrot, cauliflower, water cress, dandelion, horse-radish.

*Africa.*—Watermelon, okra.

*New Zealand.*—New Zealand spinach.

*Northern World.*—Mushrooms.

The duration of cultivation is estimated as follows:

*Four thousand to eight thousand years.*—Broad bean, cabbage, cucumber, eggplant, muskmelon, onion, pea, radish, soybean, turnip.

*Two thousand to four thousand years.*—Asparagus, kidney bean, beet, Swiss chard, Chinese cabbage, carrot, cauliflower, flint corn, garden cress, water cress, kale, kohlrabi, leek, lettuce, watermelon, rhubarb.

*One thousand to two thousand years.*—Brussels sprouts, celeriac, celery, dandelion, endive, horseradish, mushroom, okra, parsley, parsnip, pepper, sweet potato, rutabaga, spinach, winter squash, tomato.

*Approaching one thousand years.*—Pole lima bean, pumpkin, salsify, summer squash.

*About two hundred years.*—New Zealand spinach.

*About one hundred years.*—Bush lima bean, sweet corn, gherkin cucumber.

### Plant Families

The vegetables of the garden represent a considerable number of plant families. A number are here outlined.

Fungi. . . . .	Mushrooms.
Grass family. . . . .	Corn.
Lily family. . . . .	Asparagus, onion, leek, chive, garlic.
Mint family. . . . .	Thyme, mint, sage, savory, balm, basil, marjoram.
Buckwheat family. . . . .	Rhubarb, dock.
Goosefoot family. . . . .	Beet, chard, spinach, orach.
Aizoaceae family. . . . .	New Zealand spinach.
Mustard family. . . . .	Cabbage, cauliflower, broccoli, Brussels sprouts, kale, kohlrabi, turnips, Chinese cabbage, radish, horseradish, seakale, cress.
Pea family. . . . .	Bean, lima bean, pea, soybean, peanut.
Mallow family. . . . .	Okra.
Carrot family. . . . .	Carrot, celery, parsley, parsnip, fennel, dill.
Morning-glory family. . . . .	Sweet-potato.
Nightshade family. . . . .	Potato, tomato, pepper, eggplant.
Borage family. . . . .	Borage.
Gourd family. . . . .	Melon, cucumber, pumpkin, squash, gherkin.
Thistle family. . . . .	Lettuce, salsify, endive, Jerusalem artichoke, chicory, sunflower.

## Plant Parts

Different plant parts are utilized. The leaf is used of cabbage, lettuce and chives; the flower buds and flower stems of cauliflower and broccoli; the stem of kohlrabi and asparagus, the petiole or leaf stalk of rhubarb; the petiole and leaves of cress, celery, chard, dock, spinach, seakale; the greens of beet and turnip; the fruit of tomato, cucumber, melon, squash, pumpkin, solanberry and husk tomato; the tuber of potato and Jerusalem artichoke; the thickened adventitious root of sweet-potato; the bulb of onion; the root of carrot, parsnip, beet, turnip and salsify; the seed of corn, dill, caraway, sunflower, pea, bean; the seed and pod of snap bean and sugar pea.

In some cases different parts of the plant are used at different stages of development. In young beets, the leaves and stems are used as well as the root. When the crop matures only the tap root is cooked. Leaves of young onions are eaten raw or cooked, when mature, only the onion bulb is of value.

## Vegetables in the Diet

Researches of recent years have revealed that vegetables are of utmost importance in the food of mankind. The science of diet has developed rapidly during the last decade. Respective virtues of most of the common vegetables have been in considerable degree interpreted. Outstanding from a health standpoint are green-coloured vegetables. The greener the colour, the more potent is the vitamin content, the supply of iron and general nutritive value.

Inorganic, or mineral substances in the vegetables are worthy of consideration. Calcium and iron are two minerals deserving special note.

**PHOSPHATE** is present in comparatively generous amounts in peas, beans, potatoes, parsnips, cabbage and its kindred, Jerusalem artichoke, beet, turnip and carrots.

**POTASH** is abundant in the ash of Jerusalem artichoke, potatoes, beet, cabbage, beans, peas, turnips, carrot and parsnips.

**SULPHUR** is prominent in turnips, cabbage, carrots, potatoes and beet.

**SODA** is supplied in beets, carrots and in less degree in turnips and cabbage.

**LIME** is notable in cabbage, cauliflower, chard, dandelion greens, turnip tops and beet greens. It is present in good supply also in green snap beans, carrots, lettuce, okra, parsnips, spinach, turnips and water cress. It should be pointed out that although many vegetables provide lime, humans and particularly growing children, cannot obtain a sufficient supply of lime from vegetables alone. They also require food of animal origin such as milk.

**IRON** is found to some degree in all vegetables. Those rich in this element include beet tops, chard, chives, dandelion greens, kale, parsley, spinach, turnip tops, salsify and water cress. Those classed as good for iron are asparagus, green snap beans, beets, sprouting broccoli, green cabbage, cauliflower, dock, green lettuce, onion tops, pumpkin, potatoes and radish. Classed as fair are yellow snap beans, carrots, celery, chicory, eggplant, kohlrabi, leeks, okra, onions, parsnips, rhubarb, winter squash, sweet corn, tomatoes and turnips. Those with low iron content are muskmelon, swede turnip or rutabaga, summer squash and watermelon.

Vegetables of which the edible portion is high in mineral ash content are lambs-quarters, New Zealand spinach, lima beans and spinach.

The water content has a wide range of variability, from as much as 96 per cent in cucumbers and 95 per cent in Chinese cabbage, chard and lettuce, down to 65 per cent in old corn and old peas. A few other water content figures are

beets 87, cabbage 92, carrots 88, celery 93, young sweet corn 80, eggplant 92, Jerusalem artichoke 80, lambs-quarters 84, onions 87, parsnips 79, green peas 74 to 81, potatoes 78, radish 92, spinach 93, winter squash 89, tomatoes 94, and turnips 89 per cent.

Some of these crops with a high proportion of water, due to their organic acids, fats and volatile oils, are particularly valuable to the physical system.

### Vitamins

The past twenty years have seen ever growing attention paid to the vitamin content of foods. Vitamins, or vital substances, are known chiefly by the benefits bestowed on those eating them. They are absolutely essential to health. Vitamins A, B, and C are recognized as necessary for adults. Growing children must also have D. Others are important even if not yet conclusively proved to be essential to life.

**A**—is essential to growth, relates to regeneration in the retina of the eye, fortifies against night blindness, and increases resistance to disease, particularly to afflictions of the respiratory tract. It is contained in cream, butter, milk, and green or yellow vegetables and fruits. Enormously rich in A are parsley, kale, spinach, chard, dandelion, leaves of dock and lambs-quarters. Carrots, green lettuce, red peppers, yellow squash, yellow sweet-potato and ripe red tomatoes all tend to richness in this very important vitamin.

Vitamin A is primarily associated with yellow vegetable matter known as carotene. Carotene is found in large amount in carrots, and is converted into vitamin A in the animal organism. Thus the yellow pigment in vegetables and fruits suggests potential A vitamin value.

**B**—stimulates appetite, benefits digestion, tones up the muscles of the bowels, wards off nervous disorders, aids growth, affords prevention of beriberi, a disease suggestive of dropsy, and is often helpful in treatment of arthritis. It is carried notably in rice polishings, seedcoat and germ of cereals, in many fresh vegetables and fruits, and in brewers yeast. Supplies are found in beans, peas, corn, hazelnut, peanut, soybean, parsnip, spinach, sweet-potato, turnip greens, carrot, broccoli, cabbage, tomato, lettuce, turnip and kohlrabi.

**C**—prevents scurvy, helps to build strong bones and good teeth, and stimulates growth in height of children.

It occurs in most vegetables and fruits which are fresh and in prime condition. It is easily destroyed by heat which partly explains the desirability of wholesome salads and fresh, crisp, green vegetables. Cooking is best done in closed vessels. This vitamin is carried richly in cabbage, cauliflower, asparagus, horse-radish, kohlrabi, muskmelon, parsley, peppers, green and red, radish, spinach, turnip, greens and water cress. Tomatoes carry a fair amount and lettuce a small quantity.

**D**—prevents rickets and is required for formation of strong well shaped bones. Vitamin D is required most heavily during the first two years of infancy. It is probably valuable to all adults and particularly to mothers. The chief source is liver oil of cod, halibut and pilchard. Other supplies are butter from cows on pasture, chicken liver, egg yolks, and liver of beef and pork. Vegetables are not a valuable source of this vitamin.

**G**—also known as B/2, or Vitamin 9—prevents pellagra disease, tones up the skin, assists in retaining youthful vitality, and supports well being in persons of all ages. It occurs heavily in yellow soybeans, beef liver, calf liver, beef kidney, beef heart, wheat germ, dried prunes, peanuts, Cheddar cheese and egg yolk. Vegetables providing appreciable amounts include beet tops, broccoli,



turnip greens, green lettuce, spinach, dried peas, and water cress. Of vegetable products, dried yellow soybeans appear outstanding in vitamin G concentration.

**E**—is associated with fertility. It is not supposed to be very important when balanced diets are used. Wheat germ holds a rich supply.

**K**—is associated with bleeding. Deficiency of **K** is thought to cause undue bleeding from wounds. It is rich in well cured alfalfa and sweet clover. Cattle and other ruminants fed spoiled sweet clover hay, of which bacteria or moulds have destroyed the natural fat of the clover, may experience impaired health. Cattle so fed, upon being dehorned may tend to bleed profusely and even unto death.

Vitamin **K** is carried in cabbage, spinach and tomatoes.

Commenting generally on vitamin content of vegetables, it is well to remember the importance of tending produce of the garden with respectful care. Vegetables in prime condition, crisp with full sap, are much more wholesome than those partly wilted as a result of harvesting before, or after they are prime, leaving them exposed to wind, sun, rain, or in a hot kitchen, or delaying unduly their consumption after they are prepared.

Vitamin **A**, like iron content, appears to be associated with the chlorophyll of the plant. The richer green the colour, the more concentrated is the vitamin.

Vitamin **C** appears to be richest in and near the skin. Preparing the skin with the vegetable, where practical, is desirable. Cooking is best done with only a moderate amount of water and in closed vessels. The water poured from the cooked vegetables is employed to advantage in making soups.

Vitamin content varies with varieties. Some red tomatoes are much richer than other red varieties. Exposure of tomatoes to full sun may burn out the vitamins. On the other hand, partial sunlight is required for favourable development. Green tomatoes mellowed in the basement will be weak in vitamins.

### Vegetable Improvement

Selection of types superior for early maturity, production, depth, smoothness and tenderness of fleshing, drought and disease resistance, and for other desirable characters, carried on down through the centuries has wrought immense improvement. Modern garden corn may now develop to usable stage in about two months whereas originally it is said to have been a nine-months crop. A number of important crops, including cabbage, in various forms, cauliflower, broccoli, kale, and kohlrabi, are all considered to be offspring of a common ancestor, the wild cabbage of Europe (*Brassica oleracea*). The large baking potato is credited with a wild parent of which the tubers were purple, unshapely and at best about the size of a walnut.

The selection method of plant improvement is limited. It does not create new things but merely takes advantage of desirable characters already inherent in the impure types at hand. Scientific breeding of vegetable crops is now to the fore and has developed rapidly during the last two decades. The result is earlier sweet corn and melons, deeper fleshed vine crops, bush-type tomatoes which have also even colouring and are free of cracking skin, small cored carrots, mild flavoured early onions and rutabagas, stringless beans, early green sprouting broccoli, red fleshed and less acid rhubarb, smoother cucumbers with small centre and inconspicuous seeds, palatable soybeans, and many other examples of valuable progress.

Outstanding triumphs in breeding new types and strains resistant to troublesome diseases should be emphasized. This is probably one of the most gratifying contributions yet made by scientists to the vegetable industry. Examples are asparagus resistant to rust, melons resistant to wilt, beans to

mosaic and anthracnose, cabbage to yellows, peas to root-rot, and tomatoes to blossom-end rot.

The efforts towards still further superior seed stocks continue to grow. Plant breeding specialists are not only working at experiment stations, but seedsmen are engaging the best trained men obtainable. This condition is encouraging. Probably "to the improvement of garden crops there is no end," but the gardeners of the next generation are sure of new strains that will carry distinct advantages over the best now procurable.

### Vegetable Seed Stocks

After having chosen the varieties of each vegetable crop to grow, the second step is to limit plantings to tested seed. Germination should be high and the strain guaranteed true to type. Seed bought at bargain prices is usually a poor investment. Home-grown seed often gives satisfactory results. However, it should be tested as to percentage and strength of germination. Moreover, it should have been skilfully grown. The mother plant should have shown a clean bill of health, vigour, productiveness and good type. Seed from melons, cucumbers, and other vine crops should be saved only from fruits taken from blossoms which were self-pollinated by hand. Corn seed is taken only from a patch that is isolated several hundred yards from field and different varieties of sweet corn and pop corn. Some crops are naturally self pollinated and seed from them can be saved with full confidence and with little trouble. Among such are peas, beans, lettuce and tomatoes.

Viability of seed, or its retention of life, varies considerably with the species even as much as from one to six or more years. Different seeds may retain satisfactory powers of germination under moderately dry atmosphere and even, moderate, temperature storage for varying periods as follows:

*One year.*—Okra, parsley, parsnip, salsify, seakale.

*Two years.*—Leek, onion, pea, pepper.

*Three years.*—Asparagus, bean, carrot, celery, corn, kohlrabi, sage, tomato.

*Four years.*—Beet, Brussels sprouts, cabbage, cauliflower, eggplant, fennel, kale, pumpkin, radish, squash, turnip.

*Five years.*—Cucumber, endive, melon.

*Six years.*—Lettuce, vegetable marrow.

The period of germination varies from four to ten days with cabbage and kindred, chicory, endive, lettuce, radish and turnips through a period of one to two weeks for beans, cucumbers, peas, spinach and vegetable marrows to that of two to three weeks for asparagus, beets, carrots, onions and parsley.

### Shelter

A vegetable garden on the open prairies compared with another garden given similar treatment, except that the latter is placed within a substantial shelterbelt, will give smaller yield, and poorer quality produce. All prairie garden crops benefit from efficient shelter, and certainly should be so provided.

Shelter may vary from a board or lattice fence to that of temporary nature provided by planting corn or sunflowers in double rows about the perimeter of the garden, to dressing the wire fence with native grape vines, or weaving willow branches through the wires of the fence, to the planting of a thrifty hedge of caragana, lilac or honeysuckle set from a foot to a foot and a half apart, to the establishment of a complex shelterbelt of trees which is flanked on the north and west by a snowtrap. The latter will induce the snowdrifts to

accumulate during winter and as the snow melts slowly in spring, under the stress of sun rays filtering through the trees, the water may trickle through the tree belt and be absorbed in the mellow garden soil, thus increasing the reserves of moisture for the crops.

An arrangement approaching the optimum would be a caragana hedge, single row as snowtrap planted from 60 to 150 feet out from the tree belt on the north and on the west. The outer row of the shelterbelt would be caragana on the north, west and east. On the south it might be honeysuckle, saskatoon plum, hawthorn or some other fruit-bearing, dense-growing shrub. Caragana is not desirable there as it appears to be toxic after a few years to spruce trees planted as neighbours. At distances of 8 to 10 feet in from the caragana on the west and north two rows of green ash, four feet apart in the row, would be set. The inside row, at a distance of about 12 feet, on the south, west and north, would be of white spruce spaced for permanency at 4 to 6 feet. Spruce require much less soil moisture than the broad-leaf trees. They would be about 20 feet in from the first vegetable row. A single hedge row of caragana on the east side is ample.

Effective tree shelter tempers the fury of blasting winds, tending to incline them upward and away from the garden. It lessens the drying and cooling effects of north and west winds, and of the desiccating and wilting hot summer winds from the south. Not only is drying effect of winds lessened in marked degree but mechanical injury, such as the braiding of cucumber vines and the breaking over of tall stalks, is avoided.

Moisture is the almost all-important factor in prairie gardening. The chief unnecessary losses come from winds and weeds.

Previously common hemp was winning popularity as a temporary or auxiliary garden shelter. Its growth is now prohibited by law due to the poisonous principle it contains.

Finally, shelter gives comfort not only to the garden plants but to the mind of the gardener who grows them.

### **The Size and Site of the Garden**

It is well to allot  $1\frac{1}{2}$  acres to the vegetable garden. One-half of this will be in garden crops each year, the other half in summer-fallow or in crops for ploughing under for soil improvement and enrichment.

The first consideration in selecting the site is convenience. It will usually be placed to the back or side of the house kitchen, and adjoining the home fruit garden.

Deep, rich, friable soil is desired. Serviceable tree shelter is important. Proximity to the farm dugout, so that a supply of water is available for irrigation, is another virtue. The surface may slope gently, preferably to southeast. This assures good drainage. However, the slope should not be steep or run-off will be excessive; too little moisture during the prairie growing season is generally the problem rather than the contrary. A smooth even surface is desirable; depressions where water may accumulate as pot-holes are to be avoided. Depressions usually have inferior soils, and crops in depressions are subject to water injury.

A southern slope tends to early crops but is exposed to strong sun rays and drying south winds. It is favourable for tomatoes, melons and other hot-weather and long-season crops. A northern slope, in contrast, is kindly to cool-weather crops such as leaf and root crops.

### **Soil**

The home-maker has little choice of soil for his farm garden. However, if he is growing farm crops satisfactorily, his soil will be acceptable for vegetable culture. A prairie loam, black or dark brown in colour with a deep topsoil

composed of one-fifth to one-third clay, which is underlaid with a porous clay subsoil of rather open structure, and not showing any free alkali, is good.

Stiff clay is too pasty, puddles easily, is difficult to work, tends to late maturity, and often is responsible for poor quality produce. Light sand is generally loose, it lacks colloids or binding matter, gives up soil moisture quickly and is often deficient in potash. If sandy soils are light in colour they lack nitrogen. A mixture of these two contrasting soils is a great improvement over either of them. The gardener, although obliged to use the soil he has, is the master of the soil situation in considerable degree and by thoughtful management can improve the conditions under which his vegetable plants develop.

### Preparation of the Soil

To assure a good physical condition of the garden soil, rotted barnyard manure should be spread in the autumn at the rate of half to a ton to 1,000 square feet, and ploughed in deeply. Ploughing should be to a depth of eight inches or deeper and left rough on the surface for winter. The action of frost will break down the lumps, permit the absorption of snow water and favour the prompt drying of the surface in spring.

Spring work should commence only after the ground has dried to such an extent that horses feet and implements will not compact the soil below the surface. Harrowing is the chief spring tillage work. This smooths the surface and pulverizes lumps. If the soil becomes overly dry, it may be necessary to use a packer or roller to crush down lumps and bring the soil into fine friable tilth. Depressions may be filled by disking, by dragging with a plank-made float, a cyclone weeder or an Acme harrow.

Sandy or light loamy soils may be left until spring for ploughing, in which case the soil should be packed as soon as it is ploughed. Deep spring tillage opens up the soil, leaving it loose and in a condition to dry out quickly. Autumn ploughing favours the control of some insect pests.

### Feeding the Soil

Prairie garden soils are composed of varying amounts of mineral materials, which are classed according to sizes as sand, silt and clays, and of varying amounts of organic matter or humus. The latter is the remains of decomposed vegetables or animal matter. When a very large proportion of one of these is present the result is sandy, silty, clayey, or peaty soils.

Humus is mostly the residue left from roots and other plant parts of native vegetation, or of former crops and dressings of barnyard manure. Humus gives substance to light, sandy soils and lightens heavy clay soils making them more porous and friable. The dark colour of fertile soils is due to the presence of goodly amounts of humus. Such soils are rich in nitrogen and have the merit of holding, sponge-like, a large amount of moisture.

Gardeners give chief attention to three fertilizer ingredients in their soils, nitrogen, phosphate and potash. Nitrogen induces lusty growth of dark green leaves and stems. Over-abundance of nitrogen tends to late maturity of crops. Phosphate stimulates quick growth, hastens maturity, is important to root development and general plant growth, and is essential to fruitfulness and seed production. Potash enables the plant to form carbohydrate plant food such as starches and sugars and affects flavour, crispness of vegetables and scent. Thus, leafy vegetables such as lettuce, celery, spinach and cabbage benefit from a good supply of nitrogen. Their crispness and quality is improved by potash. Tomatoes use much phosphate and potatoes and beets much potash.

*Manure.*—Most prairie gardens receive fertilizer only in the form of barnyard manure. Fresh manure is not desirable as it is strawy, tending to make the soil too open, and to contribute troublesome weed seeds. Manure that is at least a year old, well rotted and wet, is favoured. It supplies food elements



in readily available form and improves the soil. Cow and horse manure are usually most available and a mixture of them is considered satisfactory. Sheep manure is particularly rich in nitrogen and potash. Pig manure is less rich in nitrogen than is horse manure, but much richer in phosphoric acid than horse or cow manure. Poultry manure should not be applied until air dried, and then sparingly as a top dressing; it ferments readily and may be injurious if in contact with seed. As a source of phosphoric acid it is richer than barnyard manure.

Barnyard manure, well rotted, may well be applied to the garden in autumn at rates of from 20 to 40 tons per acre and ploughed in deeply. This will add humus, benefit the soil texture, improve bacterial development, add warmth and supply the three essential elements at rates per ton of about 10 pounds of nitrogen, 5 pounds of phosphorus and 10 pounds of potash.

*Green Manures.*—These are a source of additional organic matter for the soil. Crops such as sweet clover, vetch, soybeans and rye may be grown and ploughed under deeply when in rank growthy condition, but previous to flowering, provided that the region is sufficiently moist. Fall rye sown in the autumn after vegetables have been removed, at the rate of three bushels per acre, is practical. The special benefit of the legumes is their accumulation in appreciable amounts of extra nitrogen from the air. Their disadvantage is the long time required to develop to the plough-under stage. Moreover, some of the legume seed is comparatively costly. A convenient combination is oats and peas, two bushels of the former and one bushel of peas.

It is a good plan to have the garden area double the size of the vegetable space planted each year. The one half may be left fallow or sown to a green manure crop. Such a crop must be of annual nature if that plot is to be planted to vegetables next season. If the vegetable area is rotated only after two or three years, alfalfa is a good choice for the green manuring. The deep roots of alfalfa reach far into the subsoil, bringing up additional plant foods from below and opening up water channels as the roots decompose following ploughing. If alfalfa or clover are used, a heavy draft is made on the subsoil moisture. Such crops should be ploughed up in sufficient time to permit water to again enter the soil before other crops are sown.

The green manure crop in the prairie garden should be ploughed under comparatively early in the season, so as to cease the demands on soil moisture made by the growing plants. Subsequent rainfall will then be stored in larger quantity for the crop grown next season.

Some gardeners recommend rolling and then disking the green manure crop prior to ploughing. This is to allow thorough covering with the soil when ploughed. A light top dressing of barnyard manure before ploughing hastens rotting.

*Commercial Fertilizers.*—The chief method employed in Canadian prairie gardens to maintain and to increase soil fertility is the ploughing in of farm manure and green manures. Recently experimenters have found significant crop response to the application of commercial fertilizers which contain substantial percentages of nitrogen and phosphorus. Prairie soils seem mostly to carry ample available potash.

Work at the Dominion Experimental Station, Scott, Sask., as well as at other stations, including Morden, indicates the value of phosphate placed close to the seed. This imparts an impetus to prompt germination and favours early maturity of nutritious vegetables. The fertilizer that has been used to obtain these results is ammonium phosphate, carrying 10 per cent nitrogen and 48 per cent phosphate. When used in early spring on cold soil, the phosphate balances the comparative low level of this ingredient in barnyard manure ploughed in the previous autumn, and the nitrogen portion supplies the needs of the young plants until the ground warming up to the sun's rays enables the soil bacteria



to make available a supply of soil nitrogen. Triple superphosphate and superphosphate are also beneficial sources of phosphate but they contain no nitrogen. Finely ground steamed bonemeal is an animal source of phosphate but is slow in action.

Some commercial gardeners are using phosphate fertilizers spread over the loaded barnyard manure spreader in the autumn to reinforce the manure with phosphate. Others follow the practice of drilling in the spring, or broadcasting the fertilizer and harrowing it in before seeding. The rate is about 200 pounds per acre. Some apply it at seeding time with a fertilizer attachment. The strong commercial fertilizer must not be in direct contact with the seed because it may injure the seed and seriously impair germination.

The ideal placement of fertilizer is in a band or strip alongside the rows,  $\frac{3}{4}$  inch away from the seed, and slightly below seed level, but not more than an inch. In such position the roots will absorb the ingredients early in their growth. Four ounces of ammonium phosphate, or six to seven ounces of a complete fertilizer of such percentage composition as 9 per cent of nitrogen, 27 per cent of phosphate and 9 per cent of potash is used to 50 feet of row.

Where the rows are one foot apart, 10 teaspoonfuls to the 50 feet of row, means an application of between 100 and 200 pounds per acre. Ten to 12 heaping dessert spoonfuls or 6 to 7 ounces, to 50 feet of row when rows are  $1\frac{1}{2}$  feet apart gives a distribution of 235 pounds per acre. For potatoes on heavy Red River soil, it has been shown by experiment that 250 pounds of 9-27-9 per acre applied two inches away from, and on either side of, and at the depth of the sets, has given excellent results.

A common method of application is to spread fertilizer at the bottom of the open trench made an inch deeper than usual, then rake in an inch of moist soil, sow the seed, cover, tramp and finally rake the surface. This may result in the drying of the soil that is moved, hence the dry soil should be moistened by the addition of water after seeding.

Commercial fertilizers may be impotent under very dry conditions. Different soils vary in their requirements. Local tests are necessary to arrive at definite conclusions as to what to use and how much. Work to date indicates general benefit from moderate amounts of well placed ammonium phosphate, for black earth soils. A complete fertilizer should be used on soils which were wooded prior to breaking.

### The Garden Plan

The building of a garden, as in the building of a house, is best when done to definite plan. The plan starts with paper, ruler and pencil. The area is outlined, the rows marked in, and required space and position allotted each crop. Details as to seed requirements are figured out and an order for the seeds placed several weeks in advance of their use. This policy assures a supply of best quality and the gardener escapes disappointment in substitution of varieties,—a condition liable to be experienced by delayed orders.

In the modern day, when work is done with ease and efficiency by machinery, the rows are long, allowing for a minimum of turning. In the farm garden plan shown in the accompanying sketches, the minimum space between rows is three feet. Perennial crops are placed at the east side and remain there for a series of years. The area in garden is somewhat over  $\frac{3}{4}$  acre. Allowance is made for moving all annual vegetable crops to the alternate garden every one, two or more years as conditions may favour.

The farmstead plan outlined is to be considered merely as suggestive. It might be preferable to have the garden and the alternate garden each 400 feet by 100 feet rather than square. The matters of irrigation, convenience to kitchen, relationship to fruit garden, shelter, tillage implements, type of soil, family needs and marketing possibilities, all deserve thought.

Some will prefer to grow the bulky crops, such as potatoes and rutabagas in the fields and have smaller vegetable gardens. Others may decide on a five-acre garden.

Some of the vegetables may be grown in the snowtrap area. A collection of annual flowers for cutting should be included in the garden in the houseward side.

### PLANTING TABLE

Crops, with seed requirements, date of sowing, depth of sowing, distance between rows and distances between plants

Crop	For 100 foot row		Date to sow or plant	Depth of seed	Distances apart		
	Seed	plants			Rows	Rows	Plants in row
					Horse cultivation	Hand cultivation	
				Inches	Feet	Inches	Inches
<b>Perennials—</b>							
Artichoke Jerusalem.....		50	April 25	4	4	24	24
Asparagus.....	1 packet	50	April 25	1	4	24	24
Celery.....	1 packet	50	April 25	$\frac{1}{2}$	4	24	24
Chives.....	1 packet	200	April 25	$\frac{1}{2}$	3	15	6
Dock.....	1 packet	100	April 25	1	3	18	12
Onions.....	1 packet	100	April 25	$\frac{1}{2}$	3	15	12
Rhubarb.....	1 packet	25	April 25	1	4	36	48
Seakale.....	1 packet	100	April 25	$\frac{1}{2}$	3	24	12
<b>General—</b>							
Beans, bush.....	1 pint		May 25	$1\frac{1}{2}$	3	24	4
Beans, pole.....	1 pint		May 25	$1\frac{1}{2}$	3	36	6-30
Beet.....	2 ounces		May 1	1	3	18	2
*Broccoli, sprouting.....	1 packet	50-75	May 25	$\frac{1}{2}$	3	30	18
Brussel sprouts.....	1 packet	50-75	May 25	$\frac{1}{2}$	3	38	36
*Cabbage.....	1 packet	50-75	May 25	$\frac{1}{2}$	3	30	18
Cabbage, chinese.....	1 packet		June 25	$\frac{1}{2}$	3	24	12
Carrot.....	1 ounce		May 1	$\frac{1}{2}$	3	18	2
*Cauliflower.....	1 packet	50-75	May 25	$\frac{1}{2}$	3	20	18
*Celery.....	1 packet	200	May 25	$\frac{1}{8}$	3-4	30	6
Chard.....	1 ounce		May 10	1	3	24	6
Chicory, Witloof.....	$\frac{1}{2}$ ounce		May 10	$\frac{1}{2}$	3	18	6
Corn—Sweet.....	4 ounces		May 15	2	3	30	16-30
Cress, upland.....	1 packet		May 1	$\frac{1}{4}$	3	18	2
Cucumber.....	$\frac{1}{2}$ ounce		May 25	1	6	72	36
*Eggplant.....	1 packet	50	June 5	$\frac{1}{2}$	3	30	18-24
Kale.....			May 10	$\frac{1}{2}$	3	30	18
Kohlrabi.....	$\frac{1}{2}$ ounce		May 1	$\frac{1}{2}$	3	18	6
Leek.....	1 ounce		May 1	1	3	18	3
Lettuce.....	1 packet	100	April 25	$\frac{1}{2}$	3	18	6-12
Muskmelon.....	1 ounce		May 25	1	6	72	30
Okra.....	2 ounces			$1\frac{1}{2}$	3	30	18
Onion, Plant.....		400	May 25	2	3	18	3
Onion, Seed.....	1 ounce		April 25	1	3	18	2
Onion, Sets.....	1 quart		May 1	2	3	18	3
Parsley.....	1 packet		May 1	$\frac{1}{4}$	3	18	6
Parsnip.....	$\frac{1}{2}$ ounce		April 25	$\frac{1}{2}$	3	18	3
Peas.....	1 pint		April 25	1	3	30	2
*Peppers.....	1 packet	50-75	June 5	$\frac{1}{2}$	3	30	18
Potato.....	6-8 pounds		May 10	4	3	30	15
Pumpkin.....	1 ounce		May 25	$1\frac{1}{2}$	9	72	30-72
Radish.....	$\frac{1}{2}$ ounce		April 25	$\frac{1}{2}$	3	18	1
Salsify.....	$\frac{1}{2}$ ounce		May 1	1	3	18	3
Spinach.....	1 ounce		April 25	$\frac{1}{2}$	3	18	4
Spinach, New Zealand.....	1 ounce		May 10	1	3	24	12
Squash—bush.....	$\frac{1}{2}$ ounce		May 15	$1\frac{1}{2}$	3	48	30
Squash—vine.....	1 ounce		May 15	$1\frac{1}{2}$	9	72	30-60
*Tomato.....	1 packet	25-50	June 5	$\frac{1}{2}$	4	36	12-48
Turnips.....	$\frac{1}{2}$ ounce		May 15	$\frac{1}{2}$	3	18	4-8
Watermelon.....	1 ounce		May 15	$1\frac{1}{2}$	9	72	30-60

\* Plants grown under glass and transplanted to the field.

Suggested dates of sowing the seed for the raising of transplants are

March 22—Celery, Peppers, Eggplant.

April 1—Tomato.

April 15—Cabbage, Cauliflower, Broccoli.

In small gardens more careful thought should be given arrangement of crops. Tall growing ones should be grouped so as not to shade sun-loving lower plants. Corn, tomatoes and melons will be placed to take advantage of maximum sunshine and heat. Short season crops will be planted as neighbours so that the ground will be cleared early.

It is well to arrange each variety of corn in a block rather than as a long row. Better pollination and fuller ears result.

### Arrangement

*Rotation of Crops.*—The rotation of crops refers to having any patch of ground sown to one type of plant this season, followed by plants of a different type next season. The advantages of arranging a sequence of contrasting crops are several. It assists controlling diseases and insects, varies the demand on soil mineral elements as some crops are deep rooted and some shallow, some are heavy and some are light feeders of potash, calcium or sulphur, some such as peas and beans fix nitrogen in the soil, and some occupy the ground for a long

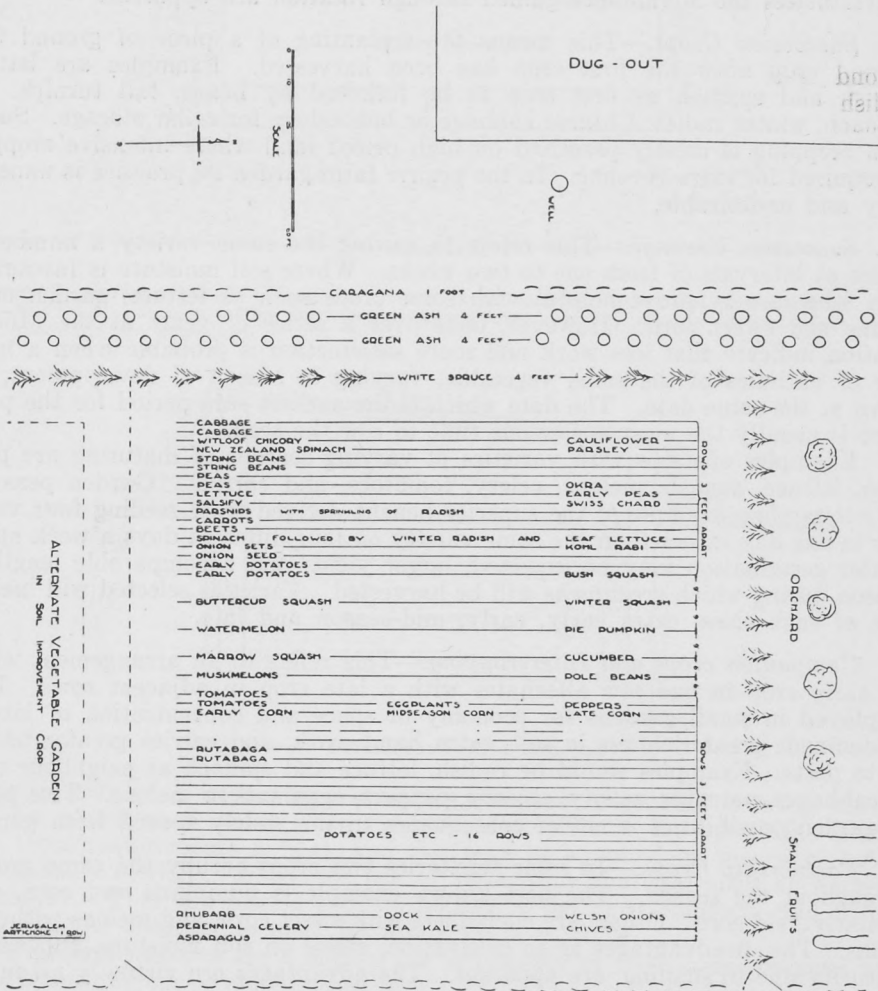


Figure 2. Vegetable garden, a suggested arrangement.

period while others have a short growing season and serve as a partial fallow for their area.

Gross-feeding exhaustive crops such as potatoes and cabbage should be shifted to new ground the year following. Shallow-rooted crops such as the cabbage group may well be succeeded by deep-rooted tap roots as carrots, parsnips and beets. In general, it is prudent to avoid having a crop follow immediately on a piece of ground that has grown plants of the same natural family. Practically all crops suffer from remaining on the same soil year after year. A possible exception is seed onions which sometimes prosper in continuing on a plot for a number of years.

A suggested rotation is potatoes, celery, carrots, beets, parsnips, salsify and similar crops, to be followed next year by peas, beans, spinach, radish, lettuce, and corn, planted the third year to cabbage, cauliflower, tomatoes, squash, melons and other vine crops.

The farm garden made up of wide-spaced rows and moved every other, or not later than every third year, to the alternate garden does not have the urgent call for rotation of crops as does the close-planted intensive garden. Nevertheless the advantages gained through rotation are apparent.

*Succession Crops.*—This means the replanting of a piece of ground to a second crop after the first crop has been harvested. Examples are lettuce, radish and spinach as first crop to be followed by beans, fall turnips, late spinach, winter radish, Chinese cabbage or late celery for cellar storage. Succession cropping is mostly practised on high priced land where intensive cropping is required for extra revenue. In the prairie farm garden its practice is unnecessary and undesirable.

*Successive Sowings.*—This refers to sowing the same variety a number of times at intervals of from one to two weeks. Where soil moisture is favourable this scheme may prove helpful with some crops such as lettuce, garden cress, beans and sweet corn. However, tests over a series of years at the Morden Station indicate that less work and more satisfaction is probable when a number of varieties of the same vegetable, varying in season of development, are sown at the same date. The date which is the earliest safe period for the plant type is usually the most auspicious time to sow the seed.

Examples of crops with varieties of varying seasons of maturing are peas, corn, lettuce, squash, melons, celery, tomatoes, and carrots. Garden peas are an outstanding example of the superior benefit derived from seeding four varieties in one day rather than the same variety on four different days a week apart. Better germination may be expected, larger yields and a comparable length of season during which green peas will be harvested. Varieties selected will include one of each class, extra early, early, mid-season and late.

*Companion crops and Intercropping.*—This refers to an arrangement where an early crop in one row alternates with a late crop in adjacent rows. It is employed in small gardens for economy of space and concentration of labour. It demands great richness in soil, extra hand work, and carries greater hazard as to pests. Examples would be radish, lettuce and spinach as neighbour rows to cabbages, parsnips, salsify, chicory, peppers, eggplants or melons. This phase of garden possibilities is not of consequence in the widely spaced farm garden.

*Partnership Crops.*—In some territories two crops occupy the same ground throughout the season. The best known example is pumpkins and corn, particularly field corn. Others are cucumbers with sweet corn, and melons with pole beans. The disadvantages as to cultivation, stress on soil moisture, and slower maturity due to shading, are apparent. The advantages are virtually nil in the spacious well sheltered garden.

Another combination might come under this heading. It is the sowing of radish, which shows out of the soil in a week, in the same seed trench as onions,

beets, parsley and fine seeded herbs which are slow in germination. The radish is called a "marker" crop is sown primarily to mark the row of the slow vegetable in the interests of cultivating safely.

### Growing Early Plants

*Hotbeds.*—In cold and temperate climates hotbeds are used extensively to raise plants for sale and to grow some vegetables to a certain stage of maturity for immediate consumption. For the home gardener their use will be principally confined to the production of vegetables for transplanting to the field. Nowadays, plants for setting out are readily purchasable, but a hotbed will enable the gardener to grow the varieties of each which he considers best suited to his locality and requirements.

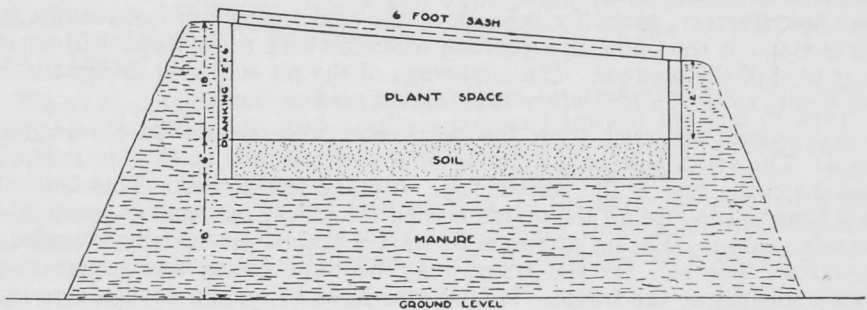


Figure 3. Surface hotbed. When the manure is put in place it is piled to the top of the frame but soon settles down with continued tramping to provide adequate foot room for the attendant.

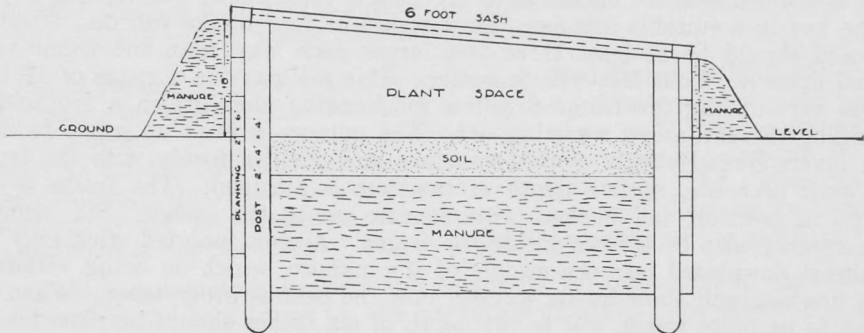


Figure 4. Permanent hotbed with pit.

Fundamentally, a hotbed is a structure designed to provide growing conditions for plants at a season when they are impossible in the open air. The first of these requirements is heat, and this may be supplied by means of hot water, steam, electricity, or by the use of fermenting material such as barnyard manure. This last named type of hotbed is the most common, and will probably be the cheapest to most for many years to come.

The materials needed for a hotbed are a quantity of fresh horse manure, a box-like frame and one or more hotbed sash.

For the prairies the manure should be gathered a few weeks before it is intended for use, and kept under cover to heat. This will be necessary especially in the case of a small hotbed. Where there are many animals kept and plenty of



manure is available, it will often heat out in the open barnyard. In both cases it should be turned two or three times until it is uniformly hot. In turning, the frozen parts and the long dry straw are rejected.

The frame is best constructed of 12" x 2" planks and of a length sufficient to take the required number of sash which are 6' x 3'. Pieces of 2" x 4" lumber should be placed 3" apart across the frame to support the sashes with a 1" dividing step between them. A two-sash frame should be the smallest frame used, for unless there is a considerable bulk of manure, fermentation will be uncertain. Sometimes house window storm sashes are used, but these are generally unsatisfactory. Several are required to cover a medium sized hotbed and they are difficult to manipulate. One or two sashes do not cover a sufficient quantity of manure.

The manure for the hotbed may be placed on the surface of the ground or in a pit dug to the required depth. In some cases the last named method has been unsatisfactory, probably because of the cold frozen soil surrounding it. If a pit is made, it should be in a position where melting snow water will not drain into it to chill the manure. The advantage of the pit is that it brings the frame itself nearer to the ground where it is less exposed to wind.

A position sheltered from the north and west should be chosen for the hotbed. The south side of a building or a shelterbelt is good. On the prairies about April the first is the correct time to make the hotbed. This date allows ample time to produce all the plants needed for setting out, and at the time when it is safe to do so. Earlier attempts to start a hotbed are usually attended with difficulties. The soil for the frame may be hard frozen and severe weather prevent opening of the frame. It may also have to remain covered for lengthy periods during which young plants will suffer damage due to lack of light, and the moist heat inside the frame.

When the manure has been turned over at least once and appears to be uniformly hot (which is indicated by vapour arising from many parts of the pile) it is time to make up the hotbed. This is commenced by marking the size of the bed in a suitable manner. Four stakes or four bricks will do. The area enclosed should be at least three feet larger each way than the frame to be placed upon it. Four feet will be better. This will provide a space of 18 to 24 inches surrounding the frame to allow for banking and furnish a foothold for attending to ventilation, watering, etc. The manure is built up in six to eight-inch layers spread evenly over the surface and trodden firmly with the feet as the work proceeds, until a depth of two feet is attained. The frame is then placed in position and banked with manure up to the sashes. Six inches of manure may also be thrown inside the frame. A stout pointed stick may now be thrust downward into the middle of the manure, which on being withdrawn each morning will show by its warmth how the heat is progressing. When it is found to be quite warm, soil to the depth of six inches should be placed in the frame. This will probably be frozen, in which case it ought to be left in a rough pile until it is fairly dry and workable. A tiny crack of air should be left on at this time to allow the escape of noxious vapours. When the soil has thawed out and appears dry on the outside, it should be spread over the frame and firmed with the feet. In a day or two the soil should be warm again after the disturbance and if an examination of the stick shows that the heat is not rising, but stationary or subsiding a little, it will be time to sow the seeds.

The seeds may be sown in shallow boxes, or pots and pans, and plunged in the soil, or they may be sown into the soil direct. The first-mentioned system is generally the better one. If sown in the soil, space must be left for transplanting the seedlings later, and very special attention must be paid to ventilation when the plants are growing freely. Such subjects as celery, peppers and eggplant which as advised elsewhere will have been sown earlier in the dwelling house, may now be moved into the hotbed.

The hotbed should be covered with bags, mats or boards to conserve the heat. Straw is not so good unless there is a layer of dense material such as canvas, next to the glass. Immediately live plants appear, close attention must be given to ventilation. A little air must be applied as soon as the sun reaches the frame. It is better to anticipate the sun a little than to leave it for even a few minutes. This should be increased as outside conditions may warrant, but must not reach a point where chilling and draughts are created. A thermometer shaded from direct sunlight will be a help. A growing temperature of 65 to 80 degrees should be aimed at. The minimum at first will probably be 70 degrees and 90 may be reached on warm days of bright sun, but no harm will result if the ventilation is right. Always open the frame on the side opposite to that from which the wind blows.

Tomatoes, peppers and eggplant need warmer conditions than the other vegetables such as cabbage, and the advantage of planting in flats and pots is that these can be moved easily to suitable quarters. By the first week in May, cabbage, cauliflower, celery and onions will be better in a cold frame. Even the tomatoes will be ready for transference to the cold frame by the middle of May.

Where the plants are growing in the soil of the frame, special care regarding keeping the plants robust and hardy is required toward the end of May. Air must be ample at all times. The sashes should be removed entirely whenever the weather is mild during the day. Air should be also admitted at night. Severe frosts may occur at any time in May, so the covering material should be kept handy, to be applied whenever this danger threatens. An outside temperature approaching the 40 degree mark at sundown may be accepted as a frost warning.

The application of water in the hotbed should receive careful thought. At the beginning little will be needed, but what is given should be warm, somewhere about the same temperature as the frame and should be applied with a fine-nozzled watercan. Flats and pots will need more than the soil. These will also need shading from bright sun before germination. A tank of water placed in full sun will supply water later in the season.

*Cold frames.*—A cold frame is really a hotbed frame without the manure, and among many other uses to which it may be put is that of a close associate of the hotbed. It is generally covered with glass sash, but sometimes with cotton or cheesecloth. Its function is to provide protection to plants at a time when supplementary heat is not necessary or desirable. The cooler conditions provided by its use strengthen the plants and enable them to withstand the transference to the open field. This is called "hardening off" in garden parlance.

Excepting tomatoes, peppers and eggplants, all the common vegetables may be moved to the cold frame by the beginning of May. The others will be safe two weeks later.

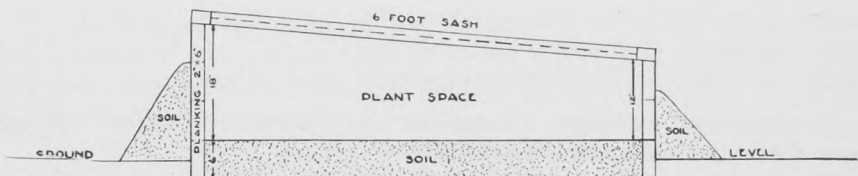


Figure 5. Cold frame.

Some protective covering similar to that provided the hotbed may often be necessary to ward off frost, and should be kept handy. It is generally assumed that the glass of a frame will keep out eight degrees of frost. Lower temperatures than this must be expected and guarded against. Twenty-two degrees of frost have been registered at Morden during the third week of May. Figure 5 shows a cold frame banked with soil, an important protective measure.

### **The Summer Use of Hotbeds and Cold Frames**

When the hotbeds and cold frames have been emptied of their occupants they may, with advantage, be planted again with many subjects if so desired. These include muskmelons and watermelons, cucumbers, lettuce, radish and celery.

**MUSKMELONS:** Probably the chance of obtaining early muskmelons will have the greatest appeal to most people, in which case preparations should be made a few weeks before the frames are empty, by sowing the seed. Assuming that the plants will all be set out by the first week in June, seed should be sown about May 1 in the hotbed. Seeds are best sown in four-inch pots or containers comparable in size. Five to seven seeds to a pot will allow some leeway for bad seeds and weaklings. Melon seed will germinate better if sown in moist soil and no water applied until the seedlings appear. Shade from bright sunshine and keep as warm as possible. Thin out the young plants to two of the strongest. Plant one double-planted pot to each sash, water well, and keep close and shaded from bright sun for a few days until established, when more air can be given. Melons enjoy warmth in soil and a humid atmosphere while growing and somewhat drier conditions when the fruits are maturing. During the early stages of growth, close the frames early in the afternoon, about four o'clock, after sprinkling with water. This closing may be done any time after two o'clock if clouds gather and there appears little likelihood of the sun becoming bright during the next hour or two. Apply water by soaking the soil well when needed rather than little and often. About twice a week is usually sufficient. Correct procedure demands close attention to ventilation. Neglect will result in scorched leaves. To take care of the early morning sun a crack of air should be given late in the evening when the frames have been closed early. The sashes may be removed entirely when there are plenty of mature leaves and the fruits are approaching maturity.

Melons produce their fruits on side branches of the main stem, and to encourage these the points of the plant should be pinched out when it has attained a length of two feet. The flowers of the melon are unisexual and hand pollination is sometimes needed when grown under glass. This is simply done by detaching a staminate or male flower and placing the pollen part of it to the stigma of the female or pistillate flower, when fully open. This is best done about noon of a bright day. The male blossoms are usually quite numerous and in clusters while the female ones are produced either singly or in pairs at the first and second joints of the side branches, and are also recognized by the embryo fruits below them.

The main object in growing melons in frames is to produce ripe fruits before then can be obtained in the open, and this can only be achieved by close attention to details of cultivation, especially those of ventilation and watering.

Recommended varieties: Champlain and Milwaukee Market. If confined to one choice the last named is preferable.

**WATERMELONS:** The cultural directions are the same as for muskmelons. Varieties,—Kleckley Sweet, Peerless, Early Kansas.

**CUCUMBERS:** From plants grown in the open, cucumbers are generally available about the middle of July. From frame-grown plants they may be gathered up to a month earlier.

The directions for growing melons should be followed except that more airy conditions may be given when well established growth is abundant. Varieties,—Delerow, Davis Perfect, Long Green Imp.

The greenhouse or telegraph type of cucumber may also be planted and grown under conditions near to those advised for melons. To obtain the greatest benefit from this plant, however, it should be grown earlier on a hotbed made up about the time of the early hotbeds, and in a frame a little deeper than used for other vegetables. This is to take care of the large leaves and longer leaf stalks. Cultural details follow closely those accorded to melons, except that the seeds are started with the earliest vegetables. One plant will quickly fill a two-sash frame. The fruits are long and slender. They are also seedless and considered of superior quality. Production may begin from the third week of May and continue until at least such time as cucumbers are gathered from the open garden.

To secure early and prolonged supplies, a regular pinching program is necessary. The point of the main stem should be taken out when it has attained a length of 18 inches. This encourages the side branches on which the fruits appear and these again are pinched at the same length. Cucumbers, and this type especially, produce their fruits on young side branches or lateral growths. Observation will show little fruitlets arranged singly or in pairs on the first two joints or nodes of these growths beyond which the joints are usually barren. Alongside these fruitlets may also be noticed the beginning of other lateral growths. When a plant is allowed to grow at will the branches continue growing in this manner. Two nodes with fruit, two or more barren nodes, then two nodes of fruit and so on. If these branches are pinched at one node beyond the last fruit, the young lateral growths are stimulated into production of more fruit bearing nodes. Attention to this control of the plant's activities greatly increases the yield. The plant enjoys humid conditions, an ample water supply and occasional stimulants of manure water. It must not be heavily shaded but a mat should be thrown on the glass during the hottest part of bright days.

**LETTUCE AND RADISH:** The chief benefit to be gained by the use of these salad plants in the hotbed is as a fall crop. This is only possible when the melons have been ripened and cleared away in good time, if possible by the end of August.

Immediately the last melon has been gathered the plants should be pulled up, the soil lightly forked over, and given a good soaking of water. A light dressing of sulphate of ammonia applied before digging will be helpful. It may be levelled with a rake and made ready for planting after standing for a day or two to drain.

Preparations for planting should have commenced three weeks to a month previously by sowing seeds in a flat or in a part of the garden convenient to water. These may be thinned out to stand an inch or two apart or transplanted to a similar distance, and kept clean and watered when necessary.

If lettuce and radish are to be planted, the rows should be marked out four inches apart across the frame and a row of lettuce alternate with one of radish. The radish seed should be sown very thinly. The seeds should be placed about one inch apart and be covered very lightly. After planting, water well, replace sashes and keep close and shaded until the radishes appear, when more air should be given. Afterwards there must be no coddling of the plants. The sashes must be removed in mild weather and maximum ventilation given night and day. Water thoroughly when the soil appears dry and keep clean of weeds.

The radishes should be ready for use in three weeks and used quickly so that they may be cleared off before they interfere with the lettuce. Any that are left after five weeks should be pulled in any case.



The lettuce should be ready for use in October and may be kept in condition deep into November if well covered up in frosty weather. Where lettuce alone is to be grown, the plants should be set out six inches apart each way.

In choosing varieties of lettuce avoid the large Iceberg type. Grand Rapids leaf lettuce is satisfactory, but better rewards will result from the use of small type head lettuce. At Morden the variety Little Gem has proved specially adapted for this work. This is a small Cos hybrid variety with a small heart of pleasing flavour.

Radish varieties recommended are,—Saxa, French Breakfast, Scarlet Turnip White-tipped.

**CELERY:** A cold frame or hotbed may be utilized to take care of surplus plants left after the field planting is supplied or it may be planned to raise enough extra plants for the purpose. The plants are set out six inches apart each way, which, with the help of the surrounding frame is so dense that the plants will blanch each other when full grown. The benefits to be expected from this procedure are early celery resulting from convenience to a water supply. This should be applied copiously together with frequent dressings of fertilizer or manure water soakings.

The variety used should be a self-blanching type.

### **Soil Sterilization**

Trouble from seedling diseases is common in seedling plants grown inside, in hotbeds or seedbeds. It is well to sterilize the soil used for such seedlings in order to kill the disease organism which attack the young plants and cause them to "damp-off". Steam forced into an inverted pan of soil so that the mass is kept near boiling point for an hour or more kills these diseases, and also destroys any insects and weed seeds present. Baking the soil in an oven is not nearly so satisfactory as cooking with steam under pressure.

Formaldehyde may be used to sterilize a mass of pulverized potting soil. Four pounds of 40 per cent formaldehyde is mixed in 32 gallons of water and this is used to wet the soil, which is then covered with canvas or paper and burlap for two days to prevent escape of the disinfecting gas. The soil should not be used until it has aired for ten days. For seedbed treatment, the mixture should be sprinkled generously on the surface until the soil is well wet and the gas confined for two days as with the potting soil.

### **Tools and Implements**

The equipment for the frame-yard includes seed pans and flats for the sowing of seed and pricking out of young plants; labels; a garden pencil which makes marks that remain legible for a long time; a rule or ruler; a tamping board to firm the soil in the flats; a tamping tin made out of an inverted can lid to which is fastened a board cross-bar for tamping down the soil in the seed pan; a small hand shovel for moving soil; a marking board levelled on one side to make seed furrows; lines for placing plants pricked out into flats; a dibble for making holes and for pressing the soil into contact with the rootlets of the transplant; a mulching tool; a coarse screen riddle for sifting lumps and foreign matter out of the soil; a fine screen for sand; and a watering can (preferably of Hawes pattern with a long spout and a well balanced handle), and rose sprinklers of two or more spray sizes. The soil suggested for flats is a mixture of three parts garden loam, two parts leaf mould or rotted manure, and one part sand.

Tools for the garden include, a narrow rake with 12-inch blade; an iron rake 16-inch; a triangular hoe for opening trenches; a garden hoe; a Harold Orchard hoe for general weeding, thinning and surface cutting; a hand cultivator; a spade; an irrigation shovel; a digging fork; a wheel-hoe for heavy soil, and a rotary cultivator for loam and light soil; a spud for removing dandelions; a



garden line on a hand reel; a trowel for transplanting; a measuring stick one by two inches and 12 feet long; a hand duster; and a knapsack or wheel-barrow sprayer. Marking stakes, and row labels are needed. A tape-line is a convenience.

Implements include a wheelbarrow; a scuffer with hiller attachments; and a narrow-tooth one-horse cultivator. To these may be added a hand seed drill (preferably with fertilizer attachment); a transplanting machine for setting out large quantities of transplants in big gardens; and a garden tractor to cultivate, plough, and open irrigation furrows.

It will be observed that some of the above are not really essential but all of the tools and most of the implements are desirable. All will be profitable possessions under certain conditions. The presence of the garden tractor will permit timely attention to garden chores that might be unfortunately delayed if obliged to wait the freedom of a horse for cultivating.

Good workmen seek good tools. Good tools mean care in keeping equipment clean, sharp and protected against rust. Every piece of equipment should be cleaned and dried as it is returned to the tool shed.

### **Sowing and Transplanting**

Suggestions as to time of sowing seed and transplanting to the garden, the depth of seeding and the spacing of plants are outlined in the Planting Table.

Seed is sown thickly enough to provide a good stand but not to overcrowd. The smaller the seed, the nearer the surface it is to be sown but all seeds should be placed in contact with moist soil. Deep sowing is more feasible on sandy soils than on stiff clays. The seedbed desired is moist but neither sappy wet nor dusty dry.

The quick method of sowing is with an efficient hand seed drill or seeder. Moreover, it gets the seed down to moist soil without leaving an open trench to dry, and firms the drill with the follow wheel. It also permits marking at the same time the position of the next row.

Most farm gardens are sown by hand. The rows are marked off, a line stretched and the seed furrow opened with a pointed or triangular hoe. Some people hoe along the line. Others stretch the line tightly, walk along it, lift the line to the next row, then open the channel for seed on the marked line. Seed is sown, the furrow filled with the moist soil by raking. The soil is tamped down with the flat of the rake head, closely tramped behind, and finally the surface raked gently to leave the soil granular on top. The trench should be open a minimum space of time.

Transplanting is preferred on a cool cloudy day or in late afternoon and evening. Preferably it will follow soon after a rain when the soil will be sufficiently moist to avoid need of watering. The plants are thoroughly watered to fill them with sap and assure the soil clinging comfortably to the roots. A generous hole is scooped out, soaked with water if dry, the plant placed, moist top soil trowelled in, and firmed by the heel of the gardener. The newly set plant is shaded with advantage for a few days by shingles or brush. This favours a prompt start into vigorous growth. If transplanting time be in hot weather some of the leaves may be nipped off to lessen the transpiration of moisture.

Plant protectors made of oiled or waxed paper, or cheap cotton supported on a lath and hoop of wire, are helpful to tomatoes, eggplant, peppers and melons. The paper caps require manipulation on hot days to provide ventilation.

When frosts threaten, the transplants may be covered in early evening with inverted baskets, berry boxes and cans or sacks, paper, moss, straw or soil.

### **Thinning**

Seed sown in the garden is sprinkled at such rates as to anticipate two to four plantlets in the space one plant will ultimately require. The surplus plants

are removed before crowding is sensed. Otherwise there is competition and starvation, plants become spindly, thin, weak and more or less permanently handicapped. Strong, vigorous, plants are selected to remain and poorly shaped and puny ones weeded out. Distances for thinning are listed in the planting table.

The home gardener may well practise, in some crops, a system of progressive thinning. The first thinning may leave double the number of carrots, beets, and onions that are to remain for main harvest. From time to time, half of these will be gathered for the kitchen, selecting the larger of each pair. The plants remaining are for main crop.

Where cutworms and other spring insect enemies threaten, thinning is done more sparingly than otherwise until the ravaging of these pests is over.

### Cultivation

There is one chief reason for cultivating the growing crop, that is to destroy weeds which pump moisture from the soil, rob nutrients from the root zones and compete with the crops for light. Less important benefits are the filling of surface cracks, forming an earth mulch to lessen evaporation, aerating the soil and thus warming it and promoting activity of bacteria and other soil organisms.

Weeds are garden enemies and to be classed with insects, as dangerous but controllable. The early seedling stage is an excellent time to eliminate them. When older they may grow again if cut off. Purslane is unusually troublesome. In seedling stage while the leaves are still red and not yet green, one brush with the back of the rake or with the wheel-hoe kills them. When they have grown a week or so they may re-establish even if pulled by the roots and left to dry on the headland for a number of days before again coming in contact with the soil.

At the Morden Station, during the conduction of mulch paper tests, the check garden was tilled by hand. Another garden, in duplicate, was associated with the checks but in it weeds were hand pulled. No hoeing was done. Most crops gave comparable yields to the cultivated garden. Onions and carrots were significantly more productive here in the absence of ground stirring. The conclusion is that cultivation may injure plant roots considerably, and a weed-free, fertile garden may require little or no cultivating. A crop that does seem to benefit from surface tillage is celery.

Surface cracks permit evaporation. Some growers claim they prefer cracks in clay soil as a maximum amount of moisture results to cracked soil in time of rain. The dust mulch assists in preventing cracks, and in lessening run-off during sharp rainfalls.

Most growers favour cultivation and commence shortly after the garden is sown. The cultivator may be set deeply at first but gradually raised as the plants grow and their roots spread out between the rows. In mid season one to 1½ inches is deep enough. Following a rain, cultivation begins as soon as the surface soil dries and before it bakes, to restore a dust or soil mulch.

### Paper Mulch

Mulch paper has been used in Hawaii for about 24 years. There it has given sufficient benefit in the growing of sugar-cane and pineapples to warrant its common use. The advantages claimed are increased soil temperature and soil moisture, and freedom from weeds.

At the Morden Station extensive tests commenced in 1929 and ran for three years. Winds caused some trouble so the heavy type black paper, Gator Hide "B", was used. The paper was laid by hand and held in place with thin boards, 1½" and long number 9 wire staples.

Conclusions were that most crops were benefited, and a number of these to a significant degree. Such included leafy crops as spinach, lettuce and cauliflower; vine crops such as cucumber and muskmelons; onions, eggplant, and early crops of beets, carrots and potatoes. The mature main crops of roots were aided but little. Similarly tomatoes and corn were not significantly affected. Under the conditions prevailing, one crop, celery, was adversely influenced by the mulch paper.

There is considerable extra labour in gardening with mulch paper. Wind damage is probable even when the heavy type paper is used. The cost of the material is a considerable item and a deterrent to its use. Finally, mulch paper is considered to possess virtues for growing some prairie garden crops and the benefits are most pronounced in dry seasons, but these generally do not sufficiently outweigh the adverse features to make for its common employment.

### Mulches

The mulch most used in the vegetable garden is what is known as the dust mulch. It is developed by keeping the top inch of soil in fine powdery condition by cultivation.

Long season crops are sometimes surface mulched to advantage with partially rotted straw, with slough hay, grass clippings or native peat. The mulch should be two or three inches deep. The crops involved are usually tomatoes, eggplants, peppers, parsnips and pole beans.

Perennial crops such as asparagus and rhubarb may be encouraged by annual mulching with rotted manure generously applied, as harvest of each crop terminates.

### Irrigation

A comforting feeling of confidence belongs to the gardener who has a supply of irrigation water. Drought is the chief handicap for the grower of prairie vegetables. It may occur in such severe form as to largely wreck the garden. It may be so slight as to be registered only by the most sensitive crops. However, the year when irrigation water in July and August will not materially benefit garden crops is the exception. Usually there is a good supply of soil moisture in early spring, following autumn rains and the absorbed snow water of March and early April. This encourages germination of early sown seeds. June is noted for rains to keep the crops growing thriftily. Thereafter, the moisture about the plant roots is likely to be less than ample.

The market gardener may feel warranted in installing costly overhead irrigation whereby he can give artificial rains to the garden as required. Most prairie farmers will be obliged not only to use furrow irrigation for their gardens but to develop their own supply by damming a creek, a coulee, or a natural draw or spring run-off channel, or to excavate a dugout reservoir in or near the snowtrap area wherein to collect water from melting snow-drifts. Plans for the construction of such reservoirs are free upon request at the P.F.R.A. Water Development Office, Regina, Saskatchewan.

Preparation of the garden for irrigation entails a nearly level surface. High spots are smoothed off and the earth filled into low places. Such work may require a scraper or even a grader. The first irrigation will show any places requiring further levelling at the end of the crop season. The ground is manured and ploughed in autumn as in the unirrigated garden. Next spring it may be helpful to drag a leveller crossways over the furrows.

The Dominion Experimental Station, Scott, Saskatchewan, has done impressive pioneer work in irrigating a quarter-acre garden from a dugout 150 feet long, 21 feet wide and 12 feet deep. Special equipment was a centrifugal pump costing \$69.00, 50 feet of three-inch pipe costing \$15.00 and 50 feet of two-

inch pipe costing \$8.00. Other equipment includes gum boots, a shovel, and canvas or burlap dams made about 4 feet by 5 feet. On one side of these dams is nailed by means of laths a 1 x 4 inch board.

Furrows are made between the rows as water channels. (Fig. 8.) The top soil is pushed back towards the plants to prevent earth about the plant becoming puddled, which would tend to baking upon drying. Earth dams may be made with the shovel but the burlap dams mentioned are time-savers. Water is applied until the soil is well moistened to spade depth.

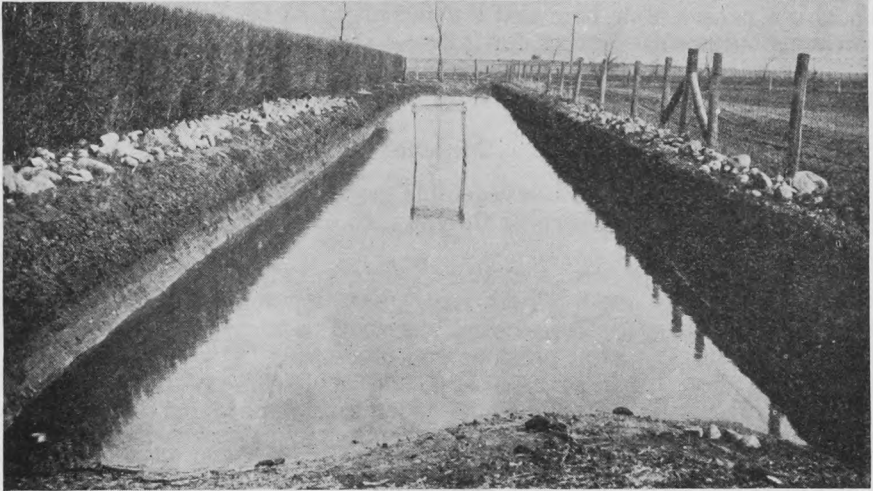


Figure 6. Dugout—Dominion Experimental Station, Scott, Sask.

The rows in the garden may necessarily be oblique in some cases, as they must run down hill with the slope of the land. The water furrow is to be without interruption from intake to the lower end. In some situations it will be desirable to have a steel pipe line placed along the top of the garden to which may be fastened fire hose by means of quick-couple joints. Such hose is light and easily moved about and will facilitate watering berry patches and special plots.

When to apply water is indicated by the soil test. A handful of earth is dug up from about the depth of a spade, eight or ten inches, and squeezed. If it crumbles down when the hand is opened the earth about the plant roots is too dry and an application of water is needed. If water is withheld and later on applied, damage is apt to show in split cabbages, tomatoes and melons, in misshapen tubers and in prematurely bolted spinach, lettuce and celery.

Following irrigation, the garden should be cultivated down promptly as the surface soil dries to friable state and is fit to work.

One type of plant may differ considerably from another in its water requirements. Lettuce, celery and other leaf and stalk vegetables should have water to keep them growing steadily along. Potatoes, beans, peas, tomatoes, corn and vine crops seldom require water until they have started to flower. From then on their needs are continuous, and in absence of rain, several irrigations at about ten-day intervals may be in order.

At the Scott Station in 1937, all crops but peppers responded to irrigation. On an acre basis, the cost of pumping and irrigation was \$36.48, the increased value of produce over the accompanying non-irrigated check garden was \$92.48, leaving a net profit of \$56.00. There is the added consideration of more palatable vegetables of finer quality which were also more nutritious with higher



content of calcium, phosphorous and iron. Moreover, lettuce and radish were ready for use 16 and 17 days earlier, respectively, from the watered garden than from the check. Details of these and subsequent tests, including the role of mineral fertilizer in the irrigated prairie farm garden are available from the Scott Station. Irrigation has been practised at the Lethbridge, Alberta, Station for many years. It is in an irrigation belt. Other prairie branch stations have commenced irrigation garden tests. Many private farmers have installed garden irrigation facilities.



Figure 7. Irrigating vegetables, using furrows. Scott, June 30, 1937.

Lacking means of irrigation, the farm gardener can do considerable to supply his vegetable area with soil moisture by sowing seeds only on summer-fallow, by wide spacing of rows, by eliminating weed growth in youngest stage, and probably most important of all, by placing the garden where it will absorb the precious snow water which trickles from the slowly melting drifts in his snowtrap under the heightening spring sun.

### Harvesting

In the modern day much of the produce coming to market is sold on grade. Condition is a feature in vegetables that is comparable in importance to that of fruits, dairy, and meat products. Promptness in harvesting and care and despatch in handling perishable vegetables should be of first consideration.

The statement 'twenty minutes from vine, or stalk, to pot' is well phrased. Sweet corn, beans and peas deteriorate rapidly after picking. Drying commences and sugars change to less digestible starches. Similar changes occur if the produce is left on the plant after reaching the ready-to-use stage.

Finest quality is found in a number of vegetables before they have reached mature size. In this class are peas, beans, sweet corn, carrots, beets and cucumbers.

Lettuce and spinach lose merit as the plants prepare to throw up flowering stalks.

Eggplants are ready when of acceptable size and colour. They should be gathered before softening begins.

Tomatoes and melons should be left on the vine until ripe. Muskmelons upon maturing form checks around the stem attachment, become paler in skin



colour, and emit fragrance. Watermelons, when tapped with the snapping finger-nail ring when green but give a thudding sound when ripe. The sound of the ripe fruit resembles that made by the finger against the front side of ones neck.

All vegetables harvested should be taken at once out of the bright sun, the rain, and the wind. Certainly they should remain but a minimum time in the hot kitchen. They are alive and respire in proportion to the heat to which they are exposed. Flavour from volatile and essential oils and from mineral salts, the vital spark substances called vitamins, the texture, and the keeping qualities, all suffer through exposure to heat and draught. Bruises and injuries encourage disease and spoiling. The aim is to eat vegetables without spot or blemish, which are charged with sap, rich in flavour and full of goodness.

### **Canning**

Physicians of the present day lay stress on the need of the liberal use of vegetables in the every day diet throughout the year. This is not only for the growing child but for adults as well. Each person is to have at least three servings daily. To accommodate such demands it is necessary to plan on canning large quantities of perishable crops and placing others which are more durable, such as dry peas and beans, onions, squash, celery, and root crops in storage. It is desirable also to provide for growing a winter cellar garden which will yield rhubarb, chicory, seakale, turnip tops, onions and possibly mushrooms. A pot or two of parsley may well be grown throughout the winter in company with the house plants. Parsley is used for garnish and flavouring and carries excellent content of vitamins A and C.

Besides these home grown supplies, it is well to plan on purchasing during the winter season, some lettuce, tomatoes and celery.

The three-quarter acre garden should provide sufficient produce for a family of five. Potatoes will be served daily, greens such as spinach, chard, beet tops, asparagus and others three times a week, lettuce or sliced cabbage three times, tomatoes daily for children and three times for adults, green peas or beans twice, dry beans or peas twice, and other vegetables at the rate of about one-third pound per person daily.

The family of five will have canned in pints about the following quantities: asparagus 16, snap beans 50, dandelions 20, spinach 24, chard 24, beet greens 16, tomatoes 50, tomato juice 50, carrots 50, beets 30, peas 40, corn 30, squash 16, and mushrooms 8.

Placed in storage will be, other than potatoes, beans  $\frac{1}{2}$  bushel, peas  $\frac{1}{2}$  bushel, cabbage 150 pounds, carrots 2 bushels, beets 1 bushel, parsnips 1 bushel, swede turnips 2 bushels, onions 2 bushels, celery 30 bunches, squash 20 fruits.

Literature dealing with procedure in canning will be mailed free of charge on request from Publicity and Extension Division, Department of Agriculture, Ottawa, Canada.

### **Drying**

Certain vegetables may be dried for storage. Peas and beans upon maturity are shelled and stored dry by many growers. Other products that may be dried in the sun or in the kitchen include celery, chives, parsley, pumpkins, squash, and various garden herbs including dill, nasturtium, sage, summer savory and thyme.

### **Storing**

A large proportion of the yearly supplies of fresh vegetables is stored. Some, such as potatoes, carrots, parsnips, beets, rutabagas, may be in storage from time of harvest until the next season's crop is ready for use. These vegetables are live products breathing in oxygen and giving off carbon dioxide

and moisture. It is important that only sound, healthy specimens be placed in storage and that they have favourable conditions as to temperature, humidity, and fresh air circulation.

Conditions sought vary considerably with the product.

Beets, carrots, parsnips, rutabaga and salsify like temperatures from 32 to 40 degrees, relatively high humidity to prevent wilting, and but little air circulation. They may be stored in bushel lug boxes or in small piles and be open or in sand, peat or sphagnum moss. Parsnips for spring use may be left in the ground over winter. Rutabagas are improved in flavour by leaving them in the field to be exposed to a brisk frost before harvest.

Potatoes differ in preferring a slightly higher temperature such as from 36 to 40 degrees. It is well to have them in slatted bins which permit circulation of air beneath as well as at the sides.

Early potatoes are not so desirable for storing as those dug in September from vines still partly green. Tubers of the latter are better to eat, and retain longer their natural rest or non-sprouting period. It is well to place them in a conic pile in the field, cover with straw and a little soil, and leave for a week or more before moving the crop to storage. This preliminary rest will allow surplus moisture to escape from the surface and permit the skins to toughen up. Freezing destroys tubers. Storage at freezing point tends to make them become sweet to taste as chemical changes turn starches toward sugar.

Cabbages of the ballhead type store well two heads deep in slat crates or on slatted shelves in a cool cellar at from 32 to 40 degrees. Very moist air favours rotting, very dry air wilting. It is a mistake to tie them up to the ridge of a root cellar as moisture condensing on them induces early spoiling. The house basement is not satisfactory as their sulphurous odours are likely to penetrate upstairs. Some of the outer leaves and part of the stem are left on. It is considered helpful to individually wrap trimmed heads in wax paper. Early cabbages are mostly stored as sauerkraut. Cabbages withstand moderate frosts.

Onions are to be dry, thoroughly cured and firm at the base of the tops before storing. They are topped about  $1\frac{1}{2}$  inches long, and placed in slatted crates, baskets or loose bags, which are deep enough to accommodate about six rows. A temperature of 32 to 34 degrees with dry air is sought.

Celery and head lettuce are moved from the field with considerable earth on their roots. They are planted in the earthen floor of the root cellar, with roots packed closely together. They should be in a room separate from strong smelling vegetables as cabbage and turnips to avoid contamination of flavour. The atmosphere should be moist and not much over 32 degrees. Watering the roots is done from time to time with a long-spouted can but in such a manner as to leave the plant foliage dry.

Squashes are kept for winter use in a dry, well ventilated room, at temperatures of from 40 to 50 degrees. Some varieties will remain in good condition deep into winter. Squash and pumpkin keep best if given two weeks preliminary storage at around 80 degrees with plenty of air, to harden their shells.

Tomatoes for autumn use are available by digging up some laden vines and suspending them by the roots from the basement ceiling. The fruits are harvested as they ripen. For early winter, firm red and large green tomatoes are wrapped in paper and packed in trays or peach cases. If the stems have been removed it adds durability if warm parawax be dropped over the stem scar on the fruit. Favourable temperature range is 45 to 55 degrees.

Peppers, eggplant, melons and cucumbers, like tomatoes, may be kept some time by wrapping in tissue paper or packing in peat or sphagnum and storing at temperatures approaching 55 degrees. It is well to think of thin-shelled eggs while handling these perishable subjects.

Parsley may be stored in dry condition but a plant or two is usually potted in late summer and grown among the house plants in winter to provide garnish material.

Peas, beans and popcorn are stored in sacks in the granary. The house is too dry and the cellar too damp to store popcorn in good condition for popping.

Places for storing vegetables differ with the locality. Most prairie farmers play safe by using the house basement and attic, and the farm root cellar, rather than depending on trenches and pits at the edge of the garden. Convenience and suitability are main considerations. A well insulated basement room in the northwest corner will serve for a number of crops. Large supplies of roots are mostly placed in outside root cellars.

The household without special storage facilities can keep potatoes and roots in fair condition for some time by making piles on the cellar floor, covering each with burlap or old sacking on which is spread two or three inches of sand or soil. The surface is moistened a couple of times a week with a watering can to discourage wilting.

Immature carrots and roots require burying in sand or peat to prevent shrivelling.

Common storages in autumn are open during the night to lower the temperature. Light in storage injures potatoes and some other crops.

### Autumn Sowing

A number of crops may be sown in the autumn, preferably in late October so that the seeds will not germinate before freeze-up. Fair results have been secured with onions, spinach, parsnip, leaf lettuce, radish, carrots, smooth-seeded peas, turnips, and tomatoes of the bush type such as the variety Farthest North. All of these germinate early in the spring with the exception of tomato which awaits the warming up of the soil in May. Seed is sown a half inch deeper than advocated for spring, as alternate freezing and thawing tends to force the seeds upwards.

At the Morden Station autumn sowing of vegetable seeds is not practised. Uneven stands caused discouragement, however the plants that did develop usually hastened their growth and excelled in earliness those coming from early spring sowing. The lack of good stand is explained in part by heaving, by blowing of the soil, and to a lesser extent by washing with spring run-off water, but chiefly by the baking of the soil surface. The clay portion of the soil tended to surface puddling and the young seedlings sometimes could emerge only through the checks or cracks. Breaking the crust with the back of a rake was not very satisfactory.

Autumn sowing of seeds might be a benefit in sandy soil which is free from spring crusting. At times it may be fully practical as Nature herself proves each spring in the volunteers which grow lustily from seeds and fruits left in the garden during harvest.

### Cellar Winter Garden

The actual growing of crops in the farm home during winter months is usually limited to pots of parsley, chives, and pans or flats of garden cress grown along with the flowers in the windows or in the sunroom. Much more substantial crops are easily developed in the basement.

Prominent among such are rhubarb and chicory. Others worthy of consideration are seakale, turnip greens and onions. A further possibility is a crop of mushrooms. As mushrooms require rather specialized care and are mostly grown during winter in caves, they will be overlooked here.

Rhubarb roots, preferably two or three years old, are dug in autumn shortly before freeze-up and left lying on the ground until frozen for two or more

weeks. To conserve moisture it is well to cover them with snow or bags. They are then placed in a cool cellar for a month or more for resting when they will be prime for forcing. A box which can be placed in a corner of the furnace room and darkened is a suitable container. The roots are set close together, packed in soil, peat, old sawdust or ashes, to retain moisture which is applied as required. In three weeks or a month harvest commences and continues for a month or more. Six roots are suggested for the average family. The resulting stems are red in colour, delicate in flavour and a tonic winter treat. Forced roots may be re-planted but should not be harvested until the second year. However, it is best to discard them after their winter produce has been gathered.

Plants of Witloof chicory are dug in late autumn, and straight roots with a single crown are selected, the leaves trimmed off at a length of an inch or more, and planted in a bushel lug box which is about a foot deep. Soil is packed in between the roots and to the top of the crowns. The roots are about an inch apart so that each is surrounded with soil. It is best to have several boxes to provide succession. Storage is in a cool cellar. Three or four weeks before the crop is wanted, a box is taken in near the furnace, moistened and a second box placed inverted over the top. This assures development in the dark, which is desired for blanched, tasty, creamy yellow hearts. Favourable temperatures are from 40 to 55 degrees. The tops are limp in comparison with crisp head lettuce and higher temperatures are adverse. A box will last for salad purposes for about two weeks. Forced chicory is primarily a salad. It replaces imported lettuce to considerable degree. The flavour is nutty with a slightly bitter tang which appeals to epicurean taste.

Seakale is treated much as Witloof chicory but is given more heat by placing it closer to the furnace. Temperatures of 45 to 55 degrees are favourable. The blanched tops are distinctly a delicacy and impart attractive appearance and unusual character to salads. They make a novel substitute for celery. The customary use, however, is as a cooked vegetable dish.

Turnip greens are developed by placing medium sized roots of turnips or of rutabagas (swede turnips) in boxes, packing soil, peat or moss about them, then watering and growing in subdued light. Temperatures may be from 50 to 60 degrees. The crop makes an acceptable substitute for spinach. Turnip greens are notable for vitamin and mineral content.

Onions are forced by setting the bulbs stem end up in soil or peat. A serviceable container is a flat or peach case. Moisture is applied as needed. Temperatures and light conditions are comparable to those of the turnips. They will tolerate considerable light. Leaves are soon pushed up and a new bulb forms at the heart of the parent bulb. When harvested the old bulb is pulled off and the young one tends to be mild and appreciated.

### **Vegetable Exhibitions**

The local garden show and seed show are community efforts towards self improvement. The home gardener entering his vegetable produce in competition is helping himself and his fellow citizens because such shows are staged for educational purposes. They stimulate effort to grow superior crops and to become acquainted with new and suitable varieties.

The exhibitor should learn what material is called for in each class. The type may be determined from illustrated catalogues of the seedsmen. The unit number will be given in the prize list, and exactly that number should be exhibited. Next, clear, small labels, stating the variety name, should accompany each exhibit. Produce should be uniform as to type, size, shape, colour and maturity. Each specimen must be free from disease and from blemishes caused by insect or mechanical injury. As a rule, the material must be in prime



maturity, ready for the table. Moderate size should be chosen over giant or dwarf sizes. The average sized vegetable is apt to be of better texture and flavour. Suitability for the table should largely determine the choice of size. An exception to this would be watermelons, which tend to be best when grown large.

Deep bright shades of colour are preferred to lighter or dull shades such as is exemplified in carrots and beets. Cauliflowers should have clear white curd rather than duller ivory colour. Rich coloured flesh for the variety is sought in muskmelons and watermelons. Stems are left on eggplants and on vine crops excepting muskmelons and cucumbers. Stems are removed from tomatoes and fruits placed blossom end up. Tap roots are to be left on root crops such as beets, carrots and turnips.

In preparing the exhibits each class deserves individual treatment.

Vegetables which may be washed, but carefully so as not to injure the thin outer skin, include,—beets, carrots, celery, leaf lettuce, New Zealand spinach, green onions, parsnips, early potatoes, radishes, salsify, spinach, turnips.

Vegetables to be brushed or wiped clean but not washed,—cabbage, cucumbers, eggplant, melons, peppers, potatoes, pumpkins, squash, tomatoes.

**SPECIAL TREATMENTS:** Asparagus is placed in a  $\frac{3}{4}$ -or 1- pound bunch, with butts even, and bands tied near the base and close to the tips.

Cauliflower is freed of all leaves but the inner fringe, and these are trimmed to an inch or two above the curd.

Celery is trimmed to remove unbleached outer leaves.

Cucumbers (pickling) are less than 4 inches long.

Onions (bulb) have roots nipped off close to the bulb, the tops removed about an inch above the bulb, and any ragged outer bulb scales also removed.

Onions (green) have roots removed, the tops trimmed to even length and bulbs tied in a bunch of the number desired.

Pumpkins and squash are cut leaving a stub of stem attached.

Rhubarb stalks are left intact at the base, the leaves trimmed about an inch above the stem.

Sweet corn ears are selected in pre-dough stage. Leave on a short shank and the husks.

### Garden Contests

Horticultural Societies often stimulate better gardens by including in their prize list an item for vegetable gardens. The score card in use in Manitoba is that shown below as approved by the Extension Service of the Manitoba Department of Agriculture.

**VEGETABLE GARDENS**

Name	Arrangement	Freedom from insects and diseases	Conditions of crop	Variety and suitability	General appearance	Total
	15	30	25	15	15	100

### Garden Calendar

The vegetable gardener has activities at his hand each of the twelve months of the year. A survey of some reminders as to monthly chores follows.

#### January—

Read garden books, bulletins, journals and magazines.

Study new seed catalogues.

Compare ratings of varieties in Experimental Station reports.



Care for cellar winter garden.  
Sketch garden plan for new season planting.

*February—*

Order seeds.  
Make and repair flats, forcing frames, frame covers.  
Sort over crops in storage.  
Arrange to keep a garden diary to record chores and observations.  
Sow seeds of Ailsa Craig or other transplant onions.

*March—*

Mix and sterilize soil for seed pans and flats.  
Secure fresh Semesan or other mercuric dusts for disinfecting seeds used for transplant production.  
Sow seeds for transplant celery, peppers and eggplants after dusting same.  
Order commercial fertilizer,—ammonium phosphate.  
Place medium sized potatoes in flats and expose to sunlight to force for early crop.  
Collect horse manure for hotbeds.  
Guide snow water from melting drifts on to garden.  
Look over stick and stake supports for climbing crops.  
Start hotbeds at end of month.

*April—*

Sow seeds of tomatoes first of April.  
Sow seeds of cabbage group middle of April.  
Sow seeds of melons for frame forcing in 4-inch pots end of April.  
Destroy stinkweed and other winter annual weeds.  
Harrow down garden when fit as to top soil moisture.  
Sow seed of hardiest crops,—onions, lettuce, radish, spinach, parsnips, carrots of the stump-rooted or Horn types, and smooth-skin peas.  
Harvest Welsh onions.  
Force a rhubarb plant by covering with a barrel or deep box banked with manure.  
Plant Jerusalem artichoke.  
Prick out young plants from seed pans into flats.  
Order insecticides and fungicides.  
Enter the district garden competition.

*May—*

Plant onion sets.  
Sow seeds for main crops as indicated in the planting table.  
Plant sprouted potatoes for early crop.  
Ply hoe and cultivator to destroy weeds, and open surface layer of soil to the sunshine and showers.  
Spread poison bran bait the evening first signs of cutworms appear.  
Set out transplant cabbage and kindred crops, also celery and onions.  
Cultivate asparagus bed and harvest tips in early mornings.  
Sow seed of chicory and seakale for winter forcing.  
Thin plants,—using some of the surplus in kitchen.  
Harden off transplant material by exposing to open air.  
Can asparagus and spinach for out-of-season use.  
Plant potted melons in frames.

*June—*

Transplant tomatoes, peppers, eggplants.  
Shade transplants temporarily if weather is hot and keenly sunny.

Complete thinning operations.

Eliminate weeds,—destroy purslane before leaves turn green.

Combat insects by dusting or spraying.

Rogue out any badly diseased or suspicious looking plants.

Treat with fungicides any outbreak of rust or similar disease.

Mulch asparagus bed with rotted manure.

Prune staked tomatoes.

Remove remains of spent crops,—radish, lettuce, cress, and spinach.

Irrigate thoroughly in absence of soaking rains.

Can peas, beans, beets.

Cultivate soil up toward potato haulms to prevent sunscalded tubers.

### *July—*

Sow Chinese cabbage.

Keep raising the dust! Use wheel-hoe on clay, rotary cultivator on loams, scufflers set at shallow depth, and Harold Orchard hoe.

Prevent bugs and blights from becoming established.

Support pole beans and pruned tomatoes on their stakes.

Irrigate as crop needs may be indicated.

Cease harvest of rhubarb July first, and pile rotted manure about the roots.

Spray whenever needed.

Shade cauliflowers by raising leaves and slipping rubber band over the tips, or covering with two tucked in cabbage leaves.

Harvest summer squash in partially grown stages.

Can chard, pole beans, beets and carrots.

### *August—*

Blanch celery.

Irrigate as required.

Combat pests,—and win out.

Discourage all weeds.

Destroy orchard, dill and other plants forming seeds which might become dispersed.

Sow lettuce, radish and spinach in open garden for autumn crops.

Collect matting for night covering of tender plants.

Exhibit at the horticultural shows.

### *September—*

Watch for neglected weeds.

Cover tender plants when night frosts threaten,—uncover in mid-morning.

Fumigate storage cellars by burning sulphur.

Clean, oil and store spray equipment.

Harvest crops, selecting well matured, sound specimens for storage.

Store potatoes in conic piles temporarily in the field to dry and toughen.

Set out new plantation of rhubarb.

Pot two plants each of parsley and chive for house growing.

Plant lettuce in hotbed frames for late crop.

Clear garden of all crop remains. Place refuse in compact pile to rot down.

### *October—*

Dig late celery, immature lettuce, brussels sprouts and cauliflower and replant on the floor of the root cellar.

Dig and store in boxes, chicory and seakale.

Dig six roots of rhubarb for cellar forcing.

Spread rotted manure on the garden,—20 tons per acre or half a ton to 1,000 square feet.

Plough deeply, 8 inches or more. Leave surface of clay ground rough even to the extent of ridging the soil to expose it to winter frosts, thus making it friable. Loam and sandy soils may be left rough but comparatively level,—otherwise the top soil tends to dry too quickly in spring and becomes too deep in dry dust.

Soils that are accustomed to drifting require auxiliary shelter as obtained from a slat snow fence and possibly covering with mulch of clean seedless hay or straw.

If autumn weather has been dry, a generous irrigation of the garden is timely.

Cut a fresh supply of wands and brush to serve as plant supports next season.

#### November—

Bank storage rooms.

Trap snowfall.

Repair tools, sharpen, oil and store.

Ventilate root cellar.

Move from the field to a cool cellar the six frozen roots of rhubarb. They require a rest period of several weeks.

#### December—

Start cellar gardens,—chicory, rhubarb, seakale.

Sort over crops in storage.

### Insects and Diseases

Publications on the control of insects and diseases can be obtained from the Dominion Department of Agriculture, Ottawa, Ont.

### Growing Crops

#### ARTICHOKE, CHINESE (*Stachys tuberifera*)

Though quite a different and distinctive plant to that of the Jerusalem artichoke the tubers resemble each other slightly, and are used in the same manner for food. The plant is a member of the mint family, 12 to 18 inches high, is a native of China and Japan and is hardy in temperate regions.

Plantings may be made in early spring in rows two feet apart and one foot in the row. The tubers do not mature until late autumn, and should be harvested as they are needed. Exposure to sun and air for lengthy periods of time renders them unfit for use.

#### ARTICHOKE GLOBE (*Cynara scolymus*)

The name artichoke is more generally associated with this large thistle-like plant of which the flower heads provide the edible part, and is considered a choice vegetable. Being a native of the seashore of southern Europe and northern Africa it is not hardy even in temperate climates. It is a perennial, but is often cultivated as a biennial, a new plantation being planted out each year and one discarded. The usual method however, is to grow selected varieties from suckers in early spring. Flower heads can be grown from seed the first year if sown early and where a long growing season is possible. As the plant demands a deep retentive soil and abundance of water its cultivation should only be attempted where irrigation is available.

#### ARTICHOKE JERUSALEM (*Helianthus tuberosus*)

This is a native perennial plant, a near relative of the sunflower and was cultivated by the Indians. As a vegetable it is not considered in high esteem although it is regarded as of importance in older countries. It is generally viewed as a weed, and will assume this character if left unmolested.

The Jerusalem artichoke is, however, a really good article of food. It has some dietetic value, especially, it is said, for children. When cooked it is somewhat watery compared with the potato. After a taste for it is acquired, it is relished. In a raw state cut up in cubes and included in salads, it is a distinctive ingredient and suggests brazil nut meat. A plantation in the chicken yard affords both shade and food to poultry.

Grown in the vegetable garden they are not difficult to keep within bounds, although attention is needed to eradicate all volunteer plants. The edible portions of the plant are the tubers which are produced somewhat like potatoes. Whole tubers, medium in size, are used for sets which are planted eighteen inches apart in rows spaced at three feet. They are ready for use in late fall when they are harvested and stored in sand in the cellar for winter use. If left in the ground over winter no harm will result, but this procedure will interfere with the fall preparation of the garden, and their use as a winter vegetable will be lost.

White skinned varieties are preferred. European catalogues list improved sorts.

#### ASPARAGUS (*Asparagus officinalis*)

Asparagus is a perennial plant native to Britain, and is grown for its succulent stems. These are produced in early spring soon after the ground warms up. It provides a fresh vegetable in a season when it is most appreciated and beneficial to health.

For these reasons, and because of the prominent place it occupies in the list of high class vegetables, it should be grown on all prairie homesteads and in urban gardens where space is available.

The plant is hardy, easy to cultivate, and when once established, will endure and be productive for many years. This will largely depend on the care and attention given to a few cultural details in the earlier years of growth, perhaps the most important one being that of exercising a restraining hand when tempted to cut the stalks. The first two or three year's efforts should all be directed towards building up a strong plant, capable of producing stout shoots at maturity.

Asparagus, being a gross feeder, and the plantation designed to last for a long period, it is necessary that the ground should be fertile and well drained. A position where water will not lie in spring is essential. Land which has been cultivated for some years or has grown a crop of wheat, corn or potatoes, should be in good condition for the purpose. It should be prepared in the fall of the year previous to planting, by being well manured and by deep ploughing.

For planting, one year old roots or crowns are generally used although two year old roots are acceptable. They may be purchased from nurseries or they may be grown at home from seed. If roots are obtained from a distance they should not be allowed to dry out, but be kept damp by heeling in temporarily, or by laying them out in a cool, damp place, watering, and planting as soon as possible. The thick fleshy roots are easily injured.

Perhaps the easiest and most convenient way to start a plantation is by sowing seed in nursery rows during the spring of the year previous to that of planting. The seed is sown thinly one inch deep in rows eighteen inches apart. When the seedlings appear they may be thinned out and spaced at two to three inches. By weeding and good cultivation good plants can be grown in a single season.

Planting should be done as early in spring as the condition of the ground will permit. When the surface is dry, harrow and pack it, then with a double mould board plough open the rows at four feet apart and eight inches deep, and level the bottom of the furrow with the shovel. For small plots the shovel may be used entirely. The plants are set at one and a half to two and a half feet

apart in the row with roots well spread out, and covered with three or four inches of soil, trodden firm. The rest of the soil is filled in by cultivation during the season and as the plants develop.

When home grown plants are used, a selection may be made of the best roots. Those which have a few relatively thick shoots, rather than those which have many thin ones should be chosen.

The asparagus is a dioecious plant which means that the female or seed-bearing flowers, and the male or staminate flowers appear on separate plants. It has been established that the male plants are more productive of thick shoots and are more lasting than the female or seedbearing type. However, to make this selection as to sex, plants must be grown in the nursery until they are three years of age.

The first and second years care of the plantation will consist of keeping it clean of weeds by frequent cultivation, attention being directed towards the prevention of the establishment of perennial weeds such as sowthistle or quack grass.

It is important that the manner of harvesting the crop should be understood. Excessive and thoughtless cutting will result in permanent injury to the plot, especially if practised during the early years. Cutting should not begin until after there has been two full seasons growth; that is in the spring of the third year from planting. Even then cutting should be restricted to a few weeks or a month at the most. Greater freedom of cutting can be permitted afterwards, but should cease completely towards the end of June. An old time rule was to quit when the first green peas were ready for use, and this is still a reliable guide. Asparagus is cut when the stems are about six inches above ground, making the cut an inch or two below the surface. An asparagus knife is better for this purpose than a kitchen or other sort. By its use there is less danger of injuring the crown of buds below the soil level. If not required for immediate use, the stems may be tied in small bundles and placed upright in shallow pans of water to preserve the freshness. Regularity in gathering the crop is advised. In warm weather, attention will be needed every morning, and no more than one morning should be missed at any time. Some growers practice keeping the plot cut clean during the productive period, cutting both thick and thin stems. Others leave the thin stems to grow. There is little evidence to support preference for either method.

*Blanched Asparagus.*—Asparagus in its green and natural state is of better quality and more healthful, but there is a certain demand for a white or blanched product. This is obtained by placing a hill of soil over the rows before growth begins, and the stems are cut when the tips appear at the surface. The knife is thrust into the side of the hill to make the cut.

*Manure and fertilizer.*—After cutting ceases for the season, a thorough cultivation should be given and a mulch of barnyard manure applied. This may be four to five inches deep, and is for the purpose of preserving moisture and assisting to build up the plants for the next season's crop. It should be left until the following spring when the rougher part may be removed and the remainder can be turned under. Old plantations may receive in addition, when cutting ceases, an application of a complete fertilizer at the rate of one thousand pounds per acre. A light dressing of a nitrogenous fertilizer such as nitrate of soda or sulphate of ammonia before growth begins will help in producing succulent stems.

*Varieties.*—The old varieties such as Palmetto, Conovers Colossal, Giant Argenteuil are still good, but they have been superseded by Mary Washington.

*Diseases and Insects.*—So far as is known, neither the asparagus beetle nor asparagus rust has been found on the prairies. The Mary Washington variety mentioned above is notably rust resistant.



*Supplementary Remarks.*—Sometimes it is necessary to protect the summer growth of asparagus from damage by strong winds. This support can be given by placing stout stakes at the ends of the rows and running binder twine along each side of the growth, supporting it by one or more stakes in the centre according to the length of the rows. Far the average farm home a row of asparagus one hundred feet long will supply the needs of a moderate family. For large plantings 3,600 to 5,500 plants per acre and for the same area four to five pounds of seed is needed.

## BEANS

From a vegetable garden viewpoint there are a number of botanically related but distinctive plants commonly known as beans. They all belong to the natural order Leguminosae and form collectively an important group of economic food plants. These comprise the string bean (variously known as snap, French, kidney or haricot bean), the lima bean, the pole bean, the broad bean and the soybean.

In Canada and the northern States at least the word bean is usually associated with the string bean. These are mostly dwarf plants but there are climbing sorts classed as pole beans.

The scarlet runner is climbing in habit and is included with the pole beans, although it belongs to another species. It is a perennial plant, whereas most other beans are annuals.

The broad bean (*Vicia faba*) is probably of minor importance, but it is grown here and there across the prairies. This also belongs to another branch of the family and it is really a nearer relative of the pea.

Cultivation of the lima bean is confined to the warmer parts of the United States, but there is a possibility of some types being made available to the more favoured parts of Canada.

The soybean has received considerable attention from plant breeders and now enters the local scene as a garden vegetable.

The parts used as food in all cases are the immature seed-carrying pod and the seed both green or immature, and ripe. Excepting the broad beans, all are warm weather plants and tender to frost. A rich, loamy, moisture-holding soil that warms up early is ideal for quick healthy growth. Dry conditions are best for ripening crops.

Insects are not usually troublesome to beans but diseases are sometimes of grave concern.

## BEAN, STRING, SNAP, FRENCH, KIDNEY OR HARICOT (*Phaseolus vulgaris*)

String or snap beans are among the most important of summer vegetables, and thrifty housewives make extensive use of them by canning for winter fare. They may also be used as dry beans when allowed to ripen. Preference in this case is given to the white seeded sorts.

The plants are easily damaged by frost, and the seed will not germinate in cold soil, so that planting must be deferred until the ground is warm and there is a reasonable chance for the seedling plants to escape being frozen. From May 15 to May 20, or when the wild plum is in bloom, is usually a safe date for sowing.

Experiments conducted for the purpose of determining the profitable distances of planting have shown the benefit of close planting in the row and a comparatively wide spacing between rows. Rows two and one half feet apart and plants spaced two inches in the row are recommended. Drills are drawn two inches deep and the seeds dropped an inch apart to be later thinned to the required distance.

To maintain a continual supply of young beans for the table it has been proved by test that a number of varieties sown at one time gives better returns

than one variety sown at intervals. The bean plant needs ample moisture for healthy and active growth and late sowings often fail to make progress due to the dryness of the soil.

Quality and the desirable delicate flavour of this vegetable is only secured from the young and immature pod. To keep the plants in a productive condition the crop must be gathered frequently. Every day will not be too often, and will be sometimes necessary.

The following is a list of varieties which will provide a succession over a long season, listed in order of earliness.

*Waxpod Varieties.*—Challenge Black Wax, Round Pod Kidney Wax, Davis White Wax, Wardwells Kidney Wax, Hodson Long Pod.

*Green Pod Varieties.*—Princess of Artois, Masterpiece, Bountiful, Stringless Green Pod.

#### BEANS, BROAD (*Vicia faba*)

The broad or Windsor bean is not widely grown in Canada. Its cultivation is probably confined to those with old world associations. The flavour is rather strong and somewhat resembles that of the lima bean intensified. Like other beans it is highly nutritious and its extended use would at least add variety to the list of vegetable dishes.

Prairie soils and climate are not favourable to the plant's welfare, but a fair yield is possible in average seasons. It likes a rather heavy clay soil, a moist air, and ample water for the roots.

Compared with other beans the plant is quite hardy, and the seed should be sown immediately the ground can be worked in the spring. The drills should be drawn three feet apart and three inches deep, usually a flatbottomed furrow is made, which will allow the seed to be planted in a double row four to six inches apart and in stagger fashion. In this manner the plants will support each other better than otherwise.

There appears to be some peculiar notions abroad regarding the preparation of this vegetable for the table. It has been variously advised to cook the pods whole, to remove the thick outer skin from the bean, and cook only the inner portion, and to carefully cut off that small fleshy part of the bean which originally connected the bean and pod. There is no factual basis for the foregoing. The beans are shelled and cooked in a manner similar to other shell beans or peas.

There are really two classes, the broad or Windsor and the long pod. The latter is the earlier, but varieties of the first named are the more satisfactory in prairie gardens.

#### BEANS, LIMA (*Phaseolus lunatus macrocarpus*)

The lima bean needs a long, warm, growing season, and its cultivation is not widely attempted in Canada. It is used mostly as a green shell bean. There are bush and pole varieties. Prospective success is probably confined to the bush types.

Seed sowing should be withheld until the ground is quite warm or about the third week in May. The rows are drawn two feet apart and two inches deep. Seeds are dropped an inch or two apart and thinned to stand six inches apart.

Jacksons Wonder Bush Lima is the only variety which has succeeded at Morden. It is ready for use in early September. The pods are small but contain substantial beans though appearing flat to the eye.

#### BEANS, POLE (*Phaseolus vulgaris*)

There are a number of plants of the bean type grown as pole beans, but only two will be considered here. These are the climbing forms of the bush or string bean (*Phaseolus vulgaris*) and the scarlet runner (*Phaseolus multi-*

*florus* or *P. coccineus*). The first named may be used as snap beans when quite young, or as green shell beans when the seeds are allowed to develop further, and even as dry beans when ripe. The scarlet runner is commonly grown as an ornamental plant for screening porches and fences, but it is of considerable value as a green bean, having rich flavour. Indeed by many it is deemed to have merits superior to the ordinary bush sorts. When gathered in the young state, they are practically stringless, and when cooked are fleshy, crisp, and of an attractive green colour. They are not good as shell beans. In dry seasons they fail to set well, but will generally produce pods in fair abundance with the advent of cool nights and fall rains. Pole beans are of value for the home garden, in that they come into bearing when the productivity of bush sorts is waning, and will continue to yield until frost.

The seed is sown as the ground has warmth enough to induce germination, usually about May 15, in rows six feet apart, dropping the beans every inch or two. After the plants appear they are thinned to stand four to six inches apart. This makes a continuous row and is best supported by tall brush five to seven feet high placed on either side of the row. The stakes must be thoroughly thrust into the ground, using a crowbar to make the holes, if necessary. As these rows form effective shelter screens they can, with advantage, be placed at points in the garden to act as windbreaks. Sometimes poles bare of twigs are used. In this case three poles are placed in the form of a triangle at distances of three feet apart each way and each group of three tied at the top, four to six seeds being sown at the foot of each pole.

There are numerous varieties of pole beans but few are listed in Canadian catalogues. The following are generally obtainable and are fairly satisfactory for prairie conditions: Kentucky Wonder or Old Homestead, Kentucky Wonder Wax, Golden Cluster Wax. Much superior has been Oregon Giant, a thick-meated variety with large mottled seeds. Improved varieties of scarlet runner with exceptionally long pods are listed by British seedsmen.

#### BEANS, NAVY OR DRY SHELL BEANS

These are types of string beans which have been specially developed for the production of the seed to be used as dry beans. The green pods may be used as a vegetable but they are not so good as the recognized varieties for this purpose. They are left to grow until the pods are quite dry and brown, when they are harvested and threshed for winter use.

Recommended varieties are Norwegian Brown, Robust, Gohns Rainy River. The first named is coloured but excellent for baking.

#### BEETS (*Beta vulgaris*)

Beets should be considered and esteemed as a very useful vegetable. The earliest thinnings are quickly available and can be used as greens, while with later thinnings when small swollen roots are formed, leaves and root are separated to provide two distinct vegetable dishes. Highest quality is attained when the roots are young and tender and about two inches in diameter. At this stage a quantity should be canned for winter use. The matured root is easily kept in storage and will keep in good condition until new, young material is available the following year.

Beets enjoy a rich sandy loam soil and comparatively cool weather, and are well adapted to the usual conditions of climate of the prairie early summer. Seed should be sown in early spring, when the land is in condition. The drills are drawn one and one-half inches deep and from eighteen inches to thirty-six inches apart. Rather thin sowings will generally provide a good stand for what is commonly regarded as a beet seed is really the corky covering of a number of seeds. Thinning may be well carried out over an extended period provided the plantlets are not too crowded, and the thinnings regularly used

for the table. They should finally stand not more than two inches apart. To obtain an extended supply of young and tender roots, beets may be sown at intervals up to the end of June. Later sowings are not generally satisfactory as conditions of soil and climate are not favourable to germination of the seed.

Beets should be harvested before the end of September as they will stand only moderate frosts. When stored in a cool cellar and covered with sand they keep in good condition for a long time. Quality mature beets are of moderate size, with smooth skin, and flesh dark and juicy. Large, coarse roots are fed to stock at harvest time.

*Recommended Varieties.*—Detroit Dark Red and Crosby Egyptian are good standard sorts. Good for All, Ohio Canner, and Perfected Detroit are recent introductions classed as superior.

#### BROCCOLI (*Brassica oleracea botrytis*)

Broccoli is a late form of cauliflower, the cultivation of which is almost entirely confined to temperate countries where the heads are produced in late fall, and continued into spring. It is harder than cauliflower but is not sufficiently so to withstand prairie winters.

However, there is a plant of comparatively recent introduction which has come to be known and accepted as broccoli. This is called Italian green sprouting broccoli or calabrese. It produces a bluish green cauliflower-like head and numerous similarly coloured sprouts from the axils of the leaves. The plant reaches maturity about the same time as cauliflower, and will continue in a productive state for a considerable period. The head and the sprouts which follow it should be cut when young and tender. It makes a good vegetable dish when cooked like cabbage or cauliflower. The methods of culture are also similar.

#### BRUSSELS SPROUTS (*Brassica oleracea gemmifera*)

This member of the cabbage family is a choice vegetable where it can be grown successfully. The edible portions of the plant are the small cabbage-like sprouts produced in the axils of the leaves. These should be firm and about the size of a large walnut to be of good quality. They are developed progressively from the base upwards to the crown of the plant, the upper ones increasing in size as the lower ones are gathered.

Brussels sprouts demand a cool temperature, with ample moisture at the root and in the air. A heavy clay loam soil with manure generously applied is also needed. The seed should be sown about April 15 in a mild hotbed, transplanted to flats and kept as cool as possible with free ventilation afterwards. During the last three weeks a cold frame will be better for the plants and the sashes should be removed on all favourable occasions to complete hardening off before planting.

The plants should be set out in late May or early June. At Morden, spacing similar to that advised for cabbage, namely two and one half by two feet was unsatisfactory. Three feet apart each way gave better results and this distance is suggested.

They can be stored in the same manner as cabbage, but the time they can be kept in good condition is short, limited perhaps to one month to six weeks.

*Varieties.*—Improved Dwarf and Long Island.

#### CABBAGE (*Brassica oleracea capitata*)

Cabbage is the most important of the leaf vegetables. It can be produced fairly early in the season and, by means of winter storage, may be available throughout the greater part of the year. As kraut, a supply may always be on hand.



For the greatest success in growing this crop, a deep, rich, moisture-holding soil is needed. A generous application of barnyard manure, preferably in the fall, and the use of nitrogenous fertilizers during the growing season are beneficial.

Cabbage may be grown without the aid of a hotbed, but as early production is very desirable, the use of one is almost indispensable. The early planting which the hotbed makes possible is an advantage in another sense. The plant needs a comparatively cool and moist climate, and this condition is only secured to an approximate degree when they are set out as early as possible, consistent with safety. For the home garden a few sorts will be found sufficient to supply the needs of a family, but where a large and consistent supply has to be maintained, early plants from a hotbed in a number of varieties with varying dates of maturity will give a better succession and a heavier yield.

Seed should be sown from April 1 to 15 according to the means adopted for raising the plants. At Morden the later date has been found to give ample time to produce the type of plant desired, when raised in the hotbed. Seed may be sown in the dwelling house window and the earlier date, above mentioned, is suitable. Seed sowing instructions are dealt with in the chapter on hotbeds. The plants should be set out at the end of May or early June. If planted before this date, there is a risk of frost damage so protection must be provided. Generous spacing is advised so that each plant has the maximum area from which to draw its food and moisture. For early varieties eighteen inches by two feet, and later ones two by two and one half or three feet are satisfactory distances. In planting a three-inch deep furrow is made with the hoe and the plants set at the bottom. The subsequent cultivation will fill in this furrow and provide some support to the lengthening stem. The furrow also gives shelter to the newly set plant.

Sometimes headed cabbages tend to split when rainfall follows a period of dry weather. The preventive is to push a spade down at one side a foot or so from the plant, and then heave the spade somewhat to break a proportion of the roots, thus lessening the intake of soil moisture.

*Varieties.*—Early,—Golden Acre, Jersey Wakefield; second early,—Copenhagen Market; late—Flat Swedish, Danish Ballhead. The last named is specially recommended for winter storage. Red Cabbage,—Red Dutch or Danish Stonehead. Savoy Cabbage,—Chester.

Savoy cabbage seems to be growing in popularity, and deserves more attention. It is distinctive in flavour, and the deep green colour of the crinkled leaves makes an attractive plant. It is hardier than common cabbage but will not endure prairie winters and must be stored. Light frosts improve its quality.

*Cabbage grown in the open.*—Where no hotbeds or cold frames are available cabbage may be grown successfully without their use, but they will be quite late in comparison. The seed should be sown as soon as the ground can be worked in the spring, preferably in a sheltered corner of the garden. It may be broadcast, but is better sown in shallow drills eight or nine inches apart, or wide enough to allow the use of a small hoe. A covering of brush will be a worthwhile protection against drying winds. The seedlings should be ready for transplanting to the field by the third week in June. If possible, choose dull showery weather for setting out the plants. It is advisable to take advantage of these conditions even if the plants seem small.

Cabbage seed may also be sown directly in the position where the plants are intended to grow. In this case three-inch deep furrows should be drawn and a few seeds dropped at the prescribed distances, lightly covered and firmed with the heel. Afterwards the seedlings are gradually thinned until they stand a single plant to the hill. Early and midseason sorts are best for outdoor



sowing. Danish Ballhead will produce heads, but much larger ones are obtained from hotbed transplants.

#### CABBAGE, CHINESE (*Brassica pekinensis*)

This is known to the Chinese as Pe-tsai, and in America sometimes as celery cabbage. This uncommon vegetable seems to be gaining in popularity. Although botanically a brassica, the growing plant has a greater resemblance to lettuce in both form and colour.

Chinese cabbage is a rapid growing plant, and needs a cool climate with generous moisture for best results. Under prairie conditions it is best sown in July so that it may develop under the benefit of the cool nights of late summer. If sown in spring it usually goes to seed quickly, and without forming heads. These heads when well grown look much like Cos lettuce and are used chiefly as a salad vegetable.

Seeds should be sown in drills drawn eighteen inches or more apart and one inch deep. The plants are afterwards thinned to stand ten to twelve inches apart in the row. The thinning may be done gradually and the larger extracted plants used as 'greens'. One ounce will sow 300 feet of row.

*Varieties.*—Chihli and Wong Bok.

#### CARROT, COMMON (*Daucus carota*)

The carrot is a native of the temperate parts of Europe, where it is used more extensively than it is in America. It is one of the staple root vegetables and by means of storage, canning, and forcing can be made available throughout the year.

A sandy loam soil is best for this crop. Heavy clay soil tends to produce many distorted roots. Probably all prairie upland soils will grow good carrots. Land which was manured for a previous crop is generally recommended. In any case fall manuring and ploughing should be practised. Seed should be sown in late April or early May, to obtain early roots for the table, and later sowings made up to the end of June will produce roots large enough for storing in the fall. Weather and soil conditions are usually unfavourable for seed germinating after this date. The young seedlings are tender and protection from frost may be provided by covering them with a little fine soil from between the rows. A light touch with the rake will uncover them when the danger is past. Distances of planting should be determined by the type of implements used for cultivation, whether hand or horse drawn. Rows from fifteen to thirty-six inches apart are suggested. The seed is sown one half to one inch deep depending on the soil type, light soil requiring the deeper sowing. Germination is rather slow, and some growers drop a few radish seeds in the rows to mark the position and to facilitate early cultivation.

Early thinning may be necessary if the rows are crowded, but otherwise it should be planned to leave them until the roots are formed and about the size of one's little finger. The carrot is at its best quality at this stage of growth, and when canned it makes an attractive pack and provides a winter delicacy much superior to the mature vegetable. Carrots are not always easy to keep in good condition under storage. They are subject to a soft rot which can, at times, be a serious menace. The crop should be harvested before there is danger of frost damage. The tops are cut off close to the root and all cracked and damaged roots discarded or reserved for immediate use. They can be stored in slatted crates if the cellar is cool and a temperature of 32 to 40 degrees can be maintained. In warmer cellars they would shrivel with this treatment and must be packed in dry sand. Roots should be dry and cool and not heated from exposure to the sun when stored.

Quality in mature carrots is shown in clear skinned shapely roots, a small core of almost the same colour as the fleshy part. A pale yellow core is undesirable.

*Varieties.*—Nantes is recommended for quality. Red cored Chantenay gives a heavier yield of good quality.

#### CAULIFLOWER (*Brassica oleracea capitata*)

Cauliflower is a form of the cabbage species, which, owing to a peculiar development of the flower stems produces a head or curd. It is much more particular as to climate than others of the cabbage family. Cool weather and ample moisture are almost essential to success. A heavy rather than a light soil is best, but prairie soils generally are suitable provided the water requirements are met. The Red river valley soil produces most excellent late cauliflower.

Cultural methods are the same as for cabbage. It is very susceptible to the damping-off fungus and the soil for seed sowing should always be sterilized, or the seed treated with a mercuric disinfectant. See section on seed sowing.

Plants raised in hotbeds as advised for cabbage should be ready for use in mid-July in favourable weather, but if overtaken by a hot period, growth may be arrested, to be resumed when stimulated by the cool nights of late August. They will then come in as a fall crop.

Cauliflower heads should be protected from discoloration by the sun. This is best done by bringing the outer leaves up over the head and tying with string or rubber band. The time to do this is immediately the curd is visible among the young leaves in the centre of the plant. Sometimes a few of the outer leaves are broken over the centre. Often these will wilt enough to let the sun rays reach the curd.

For home use cauliflower may be harvested at any time from the first appearance of the curd until they begin to stand out from the inner leaves. The younger they are the better the quality and flavour.

*Varieties.*—Early Snowball and Early Dwarf Erfurt. Good seed is just as important as variety.

#### CELERY (*Apium graveolens*)

The wild celery plant is native to southern England, Europe and Asia. In nature it has an acrid pungent flavour, which has been almost eliminated from the modern self-blanching types but is still considerable in green or winter celery.

Celery needs a rich, friable soil for best results. Commercially it is grown extensively on muck and peat and bottom lands which have great water holding capacities, but upland prairie soils will grow good celery in seasons of average rainfall. The land should receive a generous application of barnyard manure in the fall, followed by deep ploughing.

Celery is generally used as a salad plant, and is appreciated by almost everyone. It may also be used as a cooked vegetable and the outer stalks of dressed celery should be used for this purpose. In spite of its popular flavour it is rather seldom grown in the farm or home garden. This may be due to an exaggerated conception regarding its need for water.

Celery needs a long growing season, so the seed must be sown about the middle of March in a greenhouse or dwelling house window. Even where a hotbed is being considered or is being prepared, the seed should be started indoors. The seed is small and a five- or six-inch pot or can will accommodate a large number of seedlings. The containers should be well drained to at least one quarter of the depth with gravel or similar material and filled to within half an inch of the brim with sifted garden soil gently firmed. Water the pots and allow them to drain for an hour or two. Sow the seed evenly over the surface and cover very lightly with fine soil or sand. Place the containers in a warm window where a temperature of 65 to 70 degrees can be maintained, cover with a sheet of glass and shade with paper from bright sunshine. The

seed must not be allowed to get dry. The glass will conserve moisture and save frequent watering. Germination should take place in from 14 to 20 days and the young plants should be pricked out into shallow boxes or flats two inches apart when the first true leaf appears. The flats should now be placed in a hotbed where they should be shaded from bright sun for a few days until plantlets are established.

Celery should be planted in early June, to obtain the benefit of the cooler weather. Generally the plants become well established in June, make little progress in July, and grow rapidly in August. The longer cool nights of late summer seem to favour this plant. The plants should be set out six inches apart in rows two and one-half to four feet apart. If the rows are marked by furrows four to six inches deep some protection will be afforded and watering will be facilitated. The distance of the rows will depend on the intended method of blanching.

*Blanching.*—The modern self-blanching types of celery need little assistance in blanching, but the quality is improved by excluding light and air for a short period. Twelve-inch boards are extensively used, and provide the most rapid method. To adjust these properly, lay the boards flat on the ground alongside the rows with edges close to the plants. Then draw up the inside edges of the boards with light pressure against the plants. This brings all the stalks upright. The boards are kept in place by stakes driven into the ground. Individual plants may be wrapped with newspaper. Better quality celery is obtained by banking with soil, and this should be used entirely in the home garden if other considerations permit. In applying the soil, care is needed to prevent it getting into the centre of the plants. The operation is best performed by two persons, one holding the plants tightly while the other throws in the soil. The plants should be dry and the soil moist to make an effective and neat job. An application of sulphate of ammonia or a complete fertilizer followed by a good watering the day before banking will be beneficial. Where soil is used, the rows should be four feet apart as the central two feet will be needed for the banking.

Green or winter celery is generally used for storage, and needs the same treatment as the early sorts, except that it should not be blanched. The plants are dug with good balls of soil attached to the roots and packed in damp soil or sand in a cool cellar. The roots only should be covered and kept damp. Watering will be necessary during the winter but care is needed to keep the upper plant parts dry. If they are packed close together in rows with an eight-to twelve-inch space between the rows, water may be applied without wetting the stalks. The celery is ready for use when the hearts turn white.

Stored celery will absorb foreign flavours, and if possible should be placed in a cool, airy cellar free from odours of other substances. Green celery is of very good quality, and may be grown outdoors if blanched early and extra protection from frost provided.

Celery is frost tender and should be protected from early frosts by covering with straw, pea vines or corn stalks.

It has been found that in some districts celery suffers from a boron deficiency. This is recognized by a purpling of the foliage, and cracked stems on unthrifty looking plants. A light dressing of borax at the rate of one ounce to 250 square feet is recommended as a remedy.

Under prairie conditions there are few troubles with insects and diseases. Late blight and leaf spot are often seed borne. Spraying with Bordeaux mixture frequently will prevent the spread. The first application should be given before planting out or even in the seed bed.

The practice of planting celery in trenches is not recommended. Experiments have shown surface planting to be productive of better results. In making the trench, the fertile surface soil is thrown to the sides, and celery planted in the poorer subsoil.

Quality celery should have tender, thick, fleshy stalks. The colour should be clear and a cut made lengthwise through the base should show no sign of seed stalk development.

Varieties recommended are Golden Self Blanching, Golden Plume, Easy Blanching. Late or winter celery,—Winter Queen, Emperor, Salt Lake.

#### CELERY, PERENNIAL

This hardy perennial was brought from Belgium by A. Andries of Deloraine who supplied plants to the Morden Station. It is fully hardy and ripens seed annually if allowed to do so. Its value is as a flavouring for soups, stews, and other dishes. Two or three plants in the perennial garden supply the needs of a family.

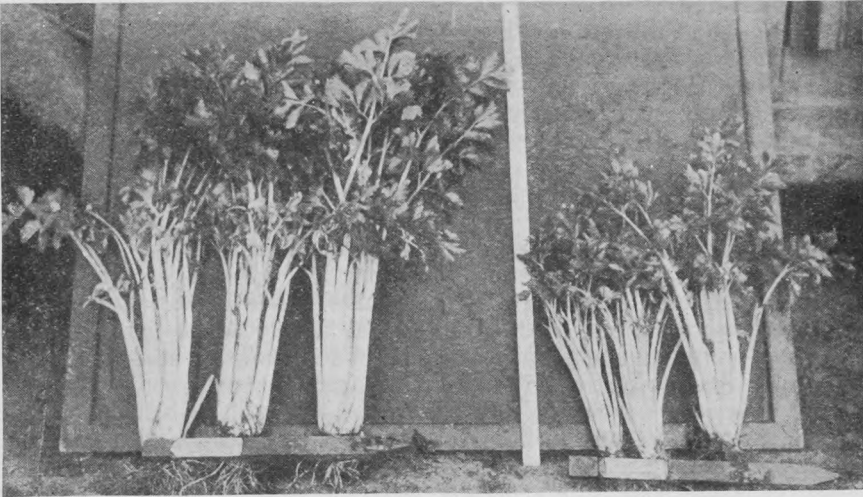


Figure 8. Irrigated celery, left; celery grown under natural rainfall, right.  
Scott, 1938.

#### CELERIAC (*Apium graveolens* var. *rapaceum*)

Celeriac or turnip-rooted celery bears the same relationship to celery as turnip-rooted parsley does to ordinary parsley. The root has been developed to a diameter of three or four inches, and is the edible part of the plant. It is used for salads but is generally cooked like other root vegetables.

Celeriac is of minor importance in America. Germany appears to be the country of its development and it is more extensively used there.

The culture is the same as for celery. No blanching is needed. The plant rows may be set closer.

#### CITRON (*Citrullus vulgaris citroides*)

This is a type of watermelon often known as preserving melon. The round fruits are smaller but more solid than dessert watermelons. Usually they are listed in catalogues as red-seeded and green-seeded. The first named is the older variety and is probably hardier than the green seeded. The latter has larger fruits.

The flesh is not edible in a raw state but is used in making preserves and pickles. The juice is said to contain a large amount of pectin, and when used in equal parts with other fruits such as cherries and peaches, which will not "jell" by themselves, will produce jelly.

This citron is not to be confused with the true citron of commerce (*Citrus medica*) which is used in making candied citron peel.



The culture is comparable to that of cucumbers and melons.

#### CHARD, SWISS OR SPINACH BEETS (*Beta cicla*)

With this member of the beet family, the leaf has been developed at the expense of the root. The leaves are light green in colour with prominent creamy white mid-ribs which are much larger than those of the root beet. In a young state the leaves may be cooked whole as 'greens' but when mature the leaf stalk or mid-rib is usually separated and when boiled resembles seakale or celery. It is a useful vegetable.

The culture of Swiss chard is similar to that given to beets, except that the plants should be thinned to nine to twelve inches apart. Lucullus is an approved variety.

#### CHICORY (*Chicorium intybus*)

The name chicory is generally associated with its use as an ingredient or adulterant of coffee. Its value as a garden vegetable or salad is not so well known. In continental Europe it is esteemed and in France is known as Barbe de Capucine or French endive. Before it can be used it must, in a sense, be grown twice. The roots are first grown in the garden and at the end of the growing season are harvested to produce the edible portion during the winter. The last mentioned part of the work is explained under Winter Cellar Garden. Here it is sufficient to discuss the production of the roots which is a simple process.

The seeds are sown in May in much the same manner as beets or carrots and in rows eighteen inches or more apart according to cultivation methods. Roots are afterwards left in the ground until late fall and harvested before the ground freezes hard. They somewhat resemble a parsnip. The important point to be observed when harvesting is that the tops must not be cut off close to the root but left about two inches long.

The variety Witloof is almost always used.

#### CHIVE (*Allium Schoenoprasum*)

This plant is native to Britain and is used as a mild substitute for onions. It forms a dense clump of slender onion-like stems about a foot in height which, when cut immediately below the soil surface resemble young green onions without the bulbous portion at the base. The plant begins to grow early in spring and is ready for use very soon after the ground thaws, wherein lies its principal value. Where it is planned to use it regularly the clumps should be cut off in succession so as to maintain a supply of young tender growths.

It is a perennial plant and is better planted with the rhubarb and asparagus. To ensure good healthy plants a new row should be planted every three or four years and the old one discarded. One old plant will provide many small portions for this purpose. They are set out fifteen inches apart in the row.

The plant is attractive when in bloom and is often planted in the rock garden.

#### CORN, POP (*Zea mays everta*)

Cultural directions for pop corn are identical with those for sweet corn. Probably most of the varieties listed in catalogues will be unsuitable for many parts of the prairies. At Morden, Golden Tom Thumb is early and reliable. It possesses very fair popping quality. A later variety for trial is Pinkie.

#### CORN, SWEET (*Zea mays rugosa*)

This plant is a member of the grass family and, according to authorities, its introduction to cultivation is of comparatively recent date. Although the Indians are credited with growing corn from very ancient times, it was probably

field corn only. Sweet corn appears in historical reference first about the beginning of the nineteenth century.

It is a warm-weather plant and likes a rich sandy loam soil, which warms up early in the spring. The seed is sown about the middle of May or when the box elder or Manitoba maple is in bloom. Sometimes the seed is sown in rows and the plants thinned to stand a foot apart, but planting in hills is generally recommended. The ground may be marked in check rows three feet apart and the seed planted two inches deep at the intersections. This allows for cultivation in both directions. Five to seven seeds are dropped to a hill and later thinned to three plants.

Advice is sometimes given to sow a favourite variety at intervals of a week or two to secure a succession of ears. Under prairie conditions it is better to sow a few varieties with different dates of maturity all at the same time. It is also considered better practice to grow corn in two or more rows of a variety than in a single row. This ensures better pollination of the ears.

Corn should occupy a different piece of ground each year to act as a partial control of smut, the only troublesome pest of this crop.

In Western Canada sweet corn is essentially a home garden vegetable and should always be enjoyed when at the peak of its quality. This condition is only obtainable over a short period, so that close attention must be given to harvesting the ears. Judging the fitness of ears of corn for table use requires a little patience and an acquaintance with varieties, to avoid wastage. The usual indications of readiness are the browning of the silk and the smooth unridged feeling of the ear through the husk.

Over a series of years removing suckers from sweet corn has shown no advantage to be gained by the practice, and plants raised in the hotbed and later planted to the field have depended on exceptionally favourable weather for beneficial results in the production of early ears. The planting of early varieties makes this practice unprofitable.

*Varieties.*—Golden Bantam is still the standard for quality and new strains with improved characters are being placed on the market regularly. This variety will probably furnish the main crop for the prairies for some considerable time. The season of sweet corn, however, may be extended by the use of some of the improved early sorts such as Banting, Golden Gem, Dorinny and Goldban. Varieties which are of later season than Golden Bantam such as Black Mexican and Howling Mob are uncertain but yield well in favourable seasons. Country Gentleman and its golden counterpart are possible in warm southern areas.

Banting, Dorinny and Goldban are results of breeding efforts at the Central Experimental Farm, Ottawa.

#### CRESS, GARDEN (*Lepidium sativum*)

This pungent flavoured salad plant must be sown early in the season to take advantage of the cooler weather, as it quickly runs to seed under dry conditions. It may be conveniently and appropriately placed in the herb patch. The leaves are used when young and tender to impart variety to the salad bowl.

#### CRESS, WATER (*Radicula nasturtium—aquaticum*)

Water cress is a perennial plant generally found growing in running streams or shallow pools. It possesses an agreeable pungent flavour, which is much relished by many people. The best product comes from pure, cold running water.

It can be grown from seeds sown in moist soil, in cold frames, hotbeds and greenhouses. When well established it can be propagated by stem cuttings. It will flower quickly during the summer months, and frequent new plantings must be made to maintain a supply of young growths.

Suitable conditions for testing out this crop have not yet been arranged at the Morden Station.

#### CUCUMBER (*Cucumis sativus*)

The cucumber is an important home garden plant today and seems to have been of some importance in ancient times even to a date three thousand years ago. It is a warm-weather plant, belonging to that group of plants known to gardeners as Cucurbita, which includes the melon, pumpkin and squash. Although of little nutritive value, it is in great demand during the summer months for salad purposes and in winter when preserved as pickles.

Cucumbers will probably grow on all warm prairie soils but a rich sandy loam soil which will warm up quickly is desirable to obtain the earliest possible production. Shelter from winds is of especial benefit in their cultivation, and even where trees and hedges are present they can be advantageously placed on the leeward side of taller growing vegetables such as corn.

Seed is usually sown from May 15 to 20 in hills spaced six feet apart each way, dropping five to seven seeds in a hill to ensure a stand of three plants each when thinned out. They may also be grown in rows six feet apart, the seed being sown thinly and the plants thinned to stand one foot apart. By this method less damage from wind-whipped plants is experienced. When the plants have grown to a length of eighteen inches the points of the main stem should be removed to induce branching.

Various methods of growing plants to obtain early production are sometimes adopted. Plants may be raised in the hotbed and planted out about the end of May, and covered with glass-topped bottomless boxes to protect them until established. There are also specially made paper covers such as "Hotcaps" supplied by the seed houses for this purpose. Seed sown in the open ground may also be covered with these devices to promote quick growth. Success in their use largely depends on the attention given to ventilation and the conditioning of the plants to withstand exposure when the covers are removed.

*Varieties.*—Improved Long Green, Davis Perfect, Early Fortune, for slicing, and National Pickling, Early Russian and Chicago Pickling for pickles.

*Novelties.*—Delerow, President, Mincu. Delerow and President possess distinctive quality with fine texture, small centre and inconspicuous seeds.

#### CUCUMBER, WEST INDIAN GHERKIN (*Cucumis anguria*)

The small immature fruits of the ordinary cucumber are sometimes called gherkins, which name may more properly be applied to the plant under review. It is a cucumber and quite recognizable as such. The stems are slender and the leaves are distinctly lobed. It is a wide spreading plant, and a prolific bearer of small, prickly fruits which has earned for it the name burr cucumber. It is used solely for pickling, for which purpose the fruits are gathered when about two inches in length. They soon become tough skinned if left on the plant.

They are cultivated similarly to other cucumbers.

#### DANDELION (*Taraxacum officinale*)

The dandelion has long been known and esteemed for its tonic properties. It is much used in Europe as a potherb and is often gathered in the wild by persons in Canada. Improvement in size and vigour has resulted from culture, and varieties now very much resemble endive. It generally is used as greens, like spinach, but it may be blanched for salads by tying up the leaves or covering with boards or boxes. The roots are also dug and forced in hotbeds and greenhouses. Dandelion seed is sown in shallow drills in the place where it is to mature and the plants thinned to stand six to ten inches apart.

*Variety.*—Improved Broad Leaf.

### DOCK SPINACH (*Rumex spp.*)

The sharpleaf dock was received in seed form as a donation from A. Andries of Deloraine who imported it from Belgium. Perennial spinach is the common name he used. At Morden it is treated as a winter annual and is grown in the perennial vegetable garden. Seed suggestive of small rhubarb seed ripens in July and falls among the parent plants. Seedlings soon show up. Sufficient are allowed to develop for next season. Growth recommences in April or early May and soon daily harvests are made of the long pointed leaves and young shoots. They make a palatable pot of greens, soft in texture and with a light acid taste. This is one of the cut-and-come-again crops. The season extends into June. This crop is valued for its earliness, its tonic and nutritive value and its dependability.

### EGGPLANT (*Solanum melongena*)

The eggplant is a near relative of the tomato and pepper. It is found in a wild state in India from whence it was probably introduced to cultivation. Eggplant is not grown to any great extent in Western Canada, and its virtues as a highly nutritious and appetizing vegetable are not widely known. Knowledge of cooking methods is also wanting among most housewives.

The plant is much more tender to frost than the tomato and really flourishes only in more southern latitudes. This statement applies particularly to the large fruited kinds such as New York Purple. There are, however, many varieties of dwarf eggplant which succeed quite well. These include, Extra Early Dwarf, Black Pekin and Early Long Purple. Black Beauty and Blackie have larger fruits and will yield fairly well in most seasons.

The seed of eggplant is slow in germination and should be sown in the greenhouse about March 21 and in a temperature of 65 to 70 degrees. When large enough to handle the seedlings are transplanted two inches apart in flats, and grown in greenhouse or hotbed, to be finally hardened off in a cold frame towards the end of May.

The plants are set out when danger of frost is past, in rows two feet apart and spaced eighteen inches apart in the row.

The potato beetle is very partial to eggplant and must be controlled.

### ENDIVE (*Cichorium endivia*)

Endive is a salad plant that is used in the same manner as lettuce, and its cultural requirements are similar. It is, however, more impatient of hot weather conditions than head lettuce and success is most likely to attend its treatment as a fall crop when sown in August. At Morden, as grown under dry land culture, it has been usually too strongly flavoured to be palatable.

### GARLIC (*Allium sativum*)

This member of the onion family has a rather strong distinctive odour. It is an important vegetable to certain European peoples and is used extensively in parts of this country. The flavour is also appreciated by epicures when very delicately used.

The onion-like bulb is made up of a number of slender segments called cloves which are covered by a light coloured skin. These cloves furnish the means of propagation, which when detached are planted a few inches apart in rows spaced twelve to fifteen inches. They are harvested similarly to shallots when the tops turn brown and dry up.

### HORSERADISH (*Radicula armoracia*)

Horseradish is a member of the Cruciferae or cabbage family and native to Europe. Both leaves and roots were used as food in the middle ages, and also for medicinal purposes. It is appreciated by many as a relish and as an accompaniment of roast beef and oysters.



The plant is winter hardy and is usually dug as needed in the farm garden, where it is generally allowed to grow at will in an odd corner or along fences. This is perhaps a better plan than having it in the garden with other crops unless it is given controlled cultivation. Under prairie conditions it can become a very troublesome weed.

Where good roots are desired, the plants should be dug in the late fall and the large central root trimmed of all small roots and packed in sand in a cool cellar for winter use. The side roots or thongs are used for propagation. Choose pieces about the thickness of one's little finger and cut to a length of eight to twelve inches. To facilitate planting in the spring the end nearest the root stock should be cut square and a slanting cut made at the other end. These should be tied in bundles and also packed in damp soil or sand until planting time. In the spring these roots are set out twelve to fifteen inches apart in rows three feet apart. If planted in good land the result will be long straight parsnip-like roots which are less woody in texture than those from uncultivated plants. Fresh ground should be used each season and clean cultivation will soon eradicate any small roots which were left on the old site.

A plantation may be more readily kept localized by planting on the slant in a prepared long mound of soil, rather than in a flat surface row.

*Variety*.—Maliner Kren.

#### KALE, OR BORECOLE (*Brassica oleracea acephala*)

Commonly known as Scotch kale, this vegetable is only grown to a small extent in prairie gardens. It is perhaps the hardiest of the cabbage group but will not stand up under western winters. In temperate climates it is a useful vegetable in that it provides abundant greens in winter, and in early spring, by means of the sprouts which emanate from the axils of the leaves after the head is cut and used. At fairs and garden shows it is frequently used as an ornament in collections of vegetables, its densely curled, crinkled, ostrich-plume-like leaves being very handsome. Albino and variegated forms in many colours were once available.

The culture is the same as for cabbage.

*Varieties*.—Tall Green Scotch Curled, and Dwarf Green Scotch Curled.

#### KOHLRABI (*Brassica oleracea caulorapa*)

Kohlrabi is probably an offshot of the cabbage tribe and is grown for the round thickened stem produced just above ground. Its cultivation is limited in extent, but it is worthy of more attention. Where garden turnip is appreciated but disregarded because of bitterness, this vegetable may well take its place. It must be used when quite small, from two to three inches in diameter but no larger than a tennis ball. They become woody with age. The flavour is suggestive of cauliflower as well as soft or summer turnips.

The seed should be sown in good rich soil in rows thirty inches apart, drilled one inch deep. This is done in early spring and two or more sowings may be made for succession, where the climate is favourable and abundant rains are experienced.

*Varieties*.—White Vienna and Purple Vienna. White Giant of Prague is a newer sort.

#### LAMBS-QUARTERS (*Chenopodium album*)

This plant frequently referred to as common pigweed, is one of the commonest weeds. It is esteemed for pot greens when harvested in quickly growing early stages. It is not cultivated intentionally but a source is usually located in ditches and fence corners. There is, however, the large leaved cultivated type.

### LEEK (*Allium porrum*)

This broad, flat leafed member of the onion family is not in much favour with prairie gardeners, although its flavour in soup is preferred by many people to that of the better known relatives. The bleached leafy stem is the edible portion of the plant but the green leaf may also be used. Served boiled with white sauce, leeks are an excellent dish.

Claiming the mediterranean region as its place of origin, it is somewhat surprising to find it growing to better effect in cool moist climates. On the prairies it may be sufficient to advise the same cultivation as that given to onions, except that soil should be drawn up to the stems to bleach them. This bleaching will be less necessary if some of the thinned out plants are transplanted into rather deep holes made with a dibble. Like onions, a much superior product may be obtained by sowing in the hotbed and following the same cultural directions as advised for large bulb onions.

Leeks will keep for a considerable time in storage if placed in boxes of damp soil in a cool cellar.

*Varieties.*—Giant Carentan and Musselburgh.

### LETTUCE, GARDEN (*Lactuca sativa*)

Wild lettuce plants are found in both Europe and America, and authorities recognize a relationship between the wildings of this continent and the garden lettuce. Its development must have taken place as an early date in Europe for its cultivation is mentioned even as far back as 500 B.C.

Lettuce is the most important of all salad crops. It is a cool and short season crop. It requires rich soil and an abundant supply of moisture for best results.

For practical purposes it can be divided into three groups, Leaf lettuce, Head lettuce and Cos lettuce. Leaf lettuce is valued for its earliness, Head lettuce for its greater palatability and crispness, and Cos lettuce which is a form of Head lettuce with an upright cylindrical head, for its distinctive flavour.

Leaf lettuce is represented in gardens almost entirely by the variety Grand Rapids; Head lettuce by New York or Wonderful and Iceberg, and Cos by Trianon and White Paris. There is also a sub-section of Head lettuce commonly known as butterhead, of which Big Boston is an example. It is of softer texture than the varieties above mentioned. Some varieties of head lettuce, especially those of a dwarf compact character are not so easy to place, being butterhead in appearance and crisp in texture. Mignonette is an example of this type.

Head lettuce will succeed in the average season with ample rainfall. It runs quickly to seed after forming heads, especially in warm weather, but will remain in good condition for a week or two in cool weather. For the home garden the above-mentioned Mignonette is recommended. The diminutive heads are quite crisp. It is a bronze leaf variety.

Lettuce should be sown as soon as the ground can be worked in the spring, in shallow drills eighteen inches apart. Thinning may be done gradually until the plants stand eight inches apart for head, and four to six inches for other sorts.

Early lettuce may be obtained by raising some plants in the hotbed, following the procedure advised for cabbage. These will be much more tender to frost than outside plants and should not be planted out until about the end of May. Some protection may be needed and water applied until well established. Only head lettuce will repay the extra work involved.

As mentioned under Hotbeds, Little Gem is a favourite for frame culture.

### MELON, MUSKMELON (*Cucumis melo*)

The muskmelon needs a rather long, warm growing season with sufficient moisture during the early stage of its growth. On the prairies it can be grown

with success only under favourable conditions of soil and situation. A rich sandy loam soil, that warms up early, and a position well sheltered from strong winds are of prime importance. The plant grows rapidly during July and early August, but the fruits ripen very slowly on the approach of cool nights. Early frosts are imminent when the ripening stage is reached, and small patches may be saved by protecting with bags or mats.

To ensure success, muskmelons are best grown in sash-covered hotbeds and cold frames. Comments are found under Hotbeds.

For culture in the open, see directions under cucumbers. The earliest good varieties at present available and the ones most likely to succeed are Lake Champlain and Northern Honeysweet. Milwaukee Market, Hales Best and Benders Surprise are later but of better quality. A large number of recent introductions are under test and many show promise.

#### MELON, WATERMELON (*Citrullus vulgaris*)

The remarks regarding the requirements and possibilities of the muskmelon apply with equal force to the watermelon. Specimen fruits up to twenty-five pounds in weight of the large fruited varieties of commerce are possible results under favourable conditions.

There is a bright prospect of varieties more adaptable to western gardens being available, and attention should be focussed on recent and future introductions. These are mostly small-fruited, early-maturing sorts of good quality and high sugar content. They come from Russia, Poland and Siberia and Japan. Some of the sweeter kinds have yellow flesh. Hybrids between imported varieties and American varieties are being developed at a number of Stations.

New early varieties include Sweet Sensation, Favourite Honey, Northern Sweet and Early Canada. A short time ago the variety Arikara introduced at Bismarck, North Dakota, was alone in the first-early class.

#### \*MUSHROOMS (*Agaricus campestris*)

There are many forms of edible fungi but the directions here given apply only to what is generally known and accepted as a mushroom and identified by the above botanical name.

Mushrooms are not difficult to grow provided a few essential details of cultivation are faithfully followed. They will not permit of a wide variation in the conditions which experience has established as being necessary for success.

The requirements for production are an available supply of horse manure and a building where an equable temperature can be maintained without, or with very little, artificial heat. A cellar that is cool and moist is often used and usually answers the purpose. The manure should be from horses that are well fed with hard food, and be uncontaminated with foreign matter such as disinfectants.

Preparations are commenced by collecting the manure and placing it under cover, until the desired quantity is obtained. Only the longest part of the straw should be removed. When fermentation begins the heap should be turned over every two or three days, taking care to turn the outside into the middle each time. If the mass appears to be dry it should be lightly sprinkled with water during the progress of turning, but on no account should it be made wet.

In about two weeks the mass should have lost most of its rank odour and have assumed a uniform brown colour throughout. It will then be ready for use, and should be made into beds. These should be as large as possible, but of a convenient size for handling. The usual size is about four feet wide and fifteen inches deep. The manure is trodden to the above mentioned depth, and made neat and shapely by beating it with the shovel. The heat of the manure will

\* Circular No. 45, Division of Botany, Dominion Department of Agriculture, Ottawa, Ont.

increase for a few days then begin to subside. A thermometer should be plunged into the bed and when it registers between 75 and 80 degrees it will be ready for spawning.

The spawn should be obtained from a reliable seedsman to ensure its good quality. It is prepared in the form of a brick. These bricks are broken into pieces about the size of a hen's egg and inserted in the manure at a distance of eight to ten inches apart and one inch below the surface. The pieces are best pressed into the bed with the fingers. In a week or ten days an examination of the bed should reveal the presence of mycelium, which appears in the form of strands radiating from the pieces of spawn. If this is well developed it is time to apply the casing of soil. This should be of a loamy nature from a pasture or the garden and should be gently made firm, and to a depth of one inch. This completes the preparation of the bed and if every phase of the work has been correctly executed, production should commence in from six to eight weeks. After-care consists of maintaining a comparatively cool temperature and a moist atmosphere.

The modern pure culture spawns are recommended as superior to the older forms and their use must follow the directions given with each variety.

Remarks.—A cellar with an earth floor is better than other kinds. A concrete floor should be covered with boards. Do not apply water to the bed unless convinced that it is dry. Use only warm water and a little at a time. Never use cold water. The bed should not be made sodden. Maintain strict cleanliness of surroundings. Look out for insects. If midge flies appear, fumigate with tobacco.

#### OKRA (*Hibiscus esculentus*)

Okra is a member of the mallow family which includes also the cotton plant, and, like it is more at home in warm, southern latitudes.

The plant has rather large pretty flowers which are succeeded by edible seed pods. These pods, when used in soups, impart a flavour and a glutinous consistency known as gumbo. They are also used in stews. The pods are gathered when two to three inches long and while still tender.

The plant will succeed in the warmer parts of the western provinces in seasons of prolonged warmth and moisture. Seed should be sown in May in shallow drills spaced at least eighteen inches apart. Afterwards plants are thinned to stand eight to nine inches apart.

Variety recommended—Dwarf Long Pod.

#### ONION (*Allium cepa*)

The onion is a member of an extensive genus belonging to the lily family. It probably originated in western Asia, and seems to have been a favourite food plant in very early times. The common onion is a very important commercial crop, and is also one of the chief vegetables in the home garden, where the quantity grown often depends on the facilities available for storage of the ripened bulbs. They are also much used in a green, or immature state.

A long growing season is needed for onions, and they should be sown as soon as the ground is dry enough in spring. The seed is sown in drills drawn one inch deep and preferably spaced eighteen inches apart. Even where horse cultivation is employed in the vegetable garden, comparatively narrow spacing may be adopted as there is usually so much hand weeding to be done with onions, regardless of the width of row. A well furnished patch of onions in the garden is impressive and often a matter of pride. The wheel-hoe and Barker cultivator are useful hand implements with onions.

The seed should be sown fairly thinly to eliminate as much as possible the thinning out of extra plants. For prairie gardens it is much better not to practise wide spacing of the plants. They should be thinned out to stand about two inches apart, both across and along the row. This will make a somewhat wide



row instead of a single line of plants. At maturity the bulbs in a row of this type appear to be pushing each other out of the ground. Under this condition they ripen better. A two- or three-inch ripe onion is more desirable than a larger one with a green top and still growing at harvest time.

Onions should be harvested before severe frosts are expected. The first few light freezings usually experienced will do no damage. They are ready for harvesting when the tops fall over and begin to turn brown. If the weather has been characteristically dry in late summer they will be in this condition about mid-September. They are then pulled up and laid out with the bulbs turned to the sun for a few days or until the leaves on most of them are dead. When harvesting, only the well ripened bulbs are kept for storage and those with green stems and leaves, known as thicknecks, are rejected or reserved for immediate use. Slatted crates of a manageable size are the best containers for storage purposes, especially for the home. They are then easily moved to new quarters if necessary. A cool, airy, dry cellar is a good storage place.

*Onions from sets.*—Earlier onions are produced by planting very small onions that were grown the previous year. These are known as sets, and are produced by sowing onion seed quite thickly in rows, and leaving it to grow unthinned. At least two hundred seeds to the foot of row is the recommended rate of sowing. The sets ripen quite early and are harvested when the leaves have dried up completely. They are sorted for size, and those of a diameter ranging from one-half to three-quarters of an inch are selected for storing. They are planted two to four inches apart in rows spaced twelve to eighteen inches apart the following spring.

They are used as green onions or as dry bulbs. The mature bulbs are not considered good for storage.

*Varieties.*—Yellow Globe Danvers, Early Red Wethersfield, Early Grano and Mountain Danvers.

*Growing Onions for large Bulbs.*—Some few years ago the method to be described was known as The New Onion Culture. Onions from two to three pounds in weight can be obtained depending on the attention given to cultivation. The practice also takes advantage of the possibilities of the Spanish type of onion such as Ailsa Craig. The seed is sown about February 22 in flats in a greenhouse for best results. If only a hotbed is available a sowing may be made about March 15 and the flat transferred to hotbed when it is ready. When the young plants are an inch or so high they are transplanted two inches apart into other flats and kept growing in a warm greenhouse or hotbed. Later, when well established, they will be better moved to a mild hotbed, where more ventilation will encourage sturdy growth. A cold frame after the first week in May will provide means by which to harden them for planting out. It may sometimes be necessary, if they have made good progress, to transplant them into a prepared cold frame in early May, spacing them four to six inches apart. They should be encouraged to grow lustily, and not retarded by want of water or room at any time.

At the end of May they should be ready for planting out into rich, well prepared soil. They are set eight inches apart in rows spaced at two feet. The plants should be transferred with as much of the root system attached as possible. A shovel rather than a trowel is the best planting tool. Care is needed to ensure that the plants are not buried too deeply. At the same time they must be made quite firm by tramping.

Clean cultivation and frequent applications of fertilizer or manure water will enable the plants to make a maximum growth.

The land for this project, unless naturally rich and deep, should receive a little extra preparation in the fall before planting. A generous application of well rotted manure should be dug into the lower strata of soil by double digging.

This is accomplished by taking out a wide trench two and a half feet wide and to the depth of a shovel. The manure is then dug into the bottom of the trench, the top soil from the next one being thrown over it. This keeps the fertile top soil uppermost and this is important. The soil from the first trench is used to fill in the last one.

These onions do not ripen, and are unsuitable for long storage. At harvest time they should be pulled up, tied in bunches and hung in a cool cellar. They will keep for a month or two in good condition.

*Varieties.*—Ailsa Craig, Prizetaker, Sweet Spanish. These are examples of a type. There are new varieties or strains being constantly introduced by seedsmen.

#### ONION, WELSH (*Allium fistulosum*)

The Welsh or Welch onion is a hardy perennial native to the Altai mountains of Siberia. How it attained its common name is not known. It is often grown as an annual or biennial. Its chief value lies in its early availability in spring. If planted as a permanent crop it should be placed with the perennial occupants of the garden such as asparagus and rhubarb.

Seed sown in spring will develop into many stemmed plants which will produce green stems and leaves the following year soon after the snow disappears. It can afterwards be perpetuated and increased by division.

#### ONIONS, TOP, TREE AND EGYPTIAN (*Allium cepa bulbifera*)

These also are hardy perennials. In their tribe, some or all of the primordial tissue, which in other onions would develop into flowers, develops into bulblets. Top onions are hardy and are reproduced by planting the bulblets or by division of the plant cluster. For the average garden they would take second place to the Welsh onion.

#### ORACH (*Atriplex hortensis*)

Orach or mountain spinach is an annual plant belonging to the goosefoot family. It is used as a substitute for ordinary spinach. There are green and red-leaved varieties. The red-leaved kind is often grown as an ornamental plant. In cooking, it loses its red colour.

Its cultivation is the same as that for common spinach. Care should be taken to remove plants before seeds ripen and blow about in the wind.

#### PARSLEY (*Petroselinum hortense*)

Parsley is the most popular plant among the garden herbs. The leaves are used for garnishing, and flavouring of sauces. It is a member of the umbelliferae family in which is included carrots, celery and parsnips.

Parsley seeds are very slow to germinate. They should be sown as soon as the ground is in condition in early spring, and the plants thinned to stand four inches apart. The rows may be from fifteen to twenty-four inches apart. A few radish seeds scattered in the seed drill will serve to mark the row and enable cultivation to proceed before the parsley plants appear.

To obtain an early supply, seed may be sown in March, in a hotbed or greenhouse. These are grown in a flat in a manner similar to celery and planted out when ready. They should be set out twelve inches apart in the row.

The strain or type variously known as Moss Curled, Triple Curled, and Extra Double Curled, is recommended.

*Parsley for winter use.*—A pot of parsley in the kitchen window during the winter is both ornamental and useful. This can be obtained with the exercise of a little care in transferring the plant from the garden to the pot. In mid-September select a plant with well curled leaves, and with a sharp shovel cut the roots by thrusting it into the ground three or four times at a few inches from

the crown of the plant, without disturbing it. The shovel should be held at a slight angle so that it cuts the tap root at the shovel's depth, below the crown. It should be then well watered and left for ten days or two weeks. During this time the plant will be making fibrous roots which will hold the soil together and make easy the transplanting. The plant should be given a good watering on the day before it is planned to lift it. When taken up the ball of soil is reduced to a size that will be accommodated by a seven-inch pot or a ten-pound honey pail. It should be made quite firm in the pot, and then placed in a shady place, watered, and allowed to remain until frosts compel its removal to the house window. In potting, most of the old leaves are cut off and not much more than the centre young leaves left. Keep in a cool window.

Parsley roots dug up roughly and potted will produce leaves eventually, but the winter will nearly be over before they will be available.

In addition to the forms grown for the foliage there is a turnip-rooted parsley which is grown for its edible root. The culture is the same as for carrots and it is stored for winter in the same way.

#### PARSNIP (*Pastinaca sativa*)

The parsnip is a native of Europe and belongs to the same family as the carrot and parsley. It is not so popular or important a root vegetable as beets or turnips. Parsnips are greatly relished by some people and intensely disliked by others. They require a deep rich soil for the proper development of their long roots, and a long growing season. Freezing is supposed to improve their quality

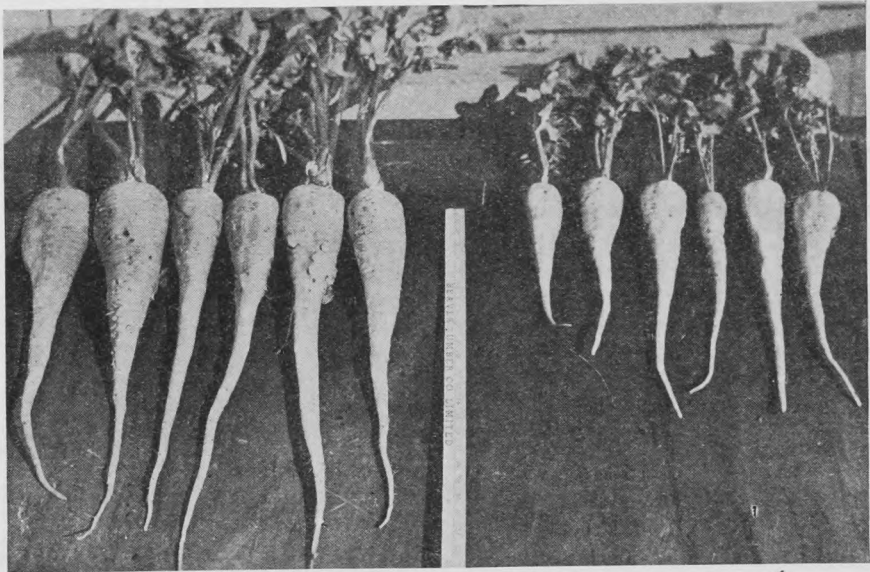


Figure 9. Irrigated parsnips, left; parsnips grown under natural rainfall, right. Scott, 1938.

as they are left in the ground until late in the fall. They are quite hardy and may be left in the ground over winter without suffering damage. In this case, they should be dug before they begin to grow in the spring, as renewed top growth affects the quality. Harvesting, however, is almost invariably done just before freeze-up and in time to allow ploughing to be done. They are stored similarly to other root vegetables, and thus made available during the winter months.

Parsnips are usually one of the first vegetables to be sown in the spring, partly because of the long growing season needed and also because the seed

is slow to germinate. The early sowing benefits from the greater degree of soil moisture. The seed is sown an inch deep in drills drawn thirty inches or more apart, and the plants thinned to stand two inches apart in the row. A few radish seeds dropped in the row will mark it for convenience in early cultivation.

*Varieties.*—Hollow Crown and Guernsey. There is a turnip-rooted variety which appears to find scant favour.

#### PEA, COMMON (*Pisum sativum*)

The pea is probably a native of Europe and came to America with the first immigrants. Its culture goes back to the days of ancient Rome.

Peas are an important garden crop wherever they can be grown. They rank as a high-class vegetable and are appreciated by everyone and at all times. They are a cool season crop and prefer a somewhat heavy soil which, however, should be well drained.

Dry peas are either smooth or wrinkled; the first-named type are hardier but the latter excel in flavour. The smooth-seeded varieties are used for early crops as the seed germinates better in cold soils. Their value in this regard for the prairie garden is not pronounced, as the soil warms up quickly. The pods are small, and there is only a day or two gained by using a smooth-seeded sort in preference to a wrinkled one.

Peas vary greatly in length of vine, and range from about one foot to five feet or more. The tall varieties produce the largest pods, but they appear to do well only when staked. Those of moderate growth are the sorts generally grown.

In temperate climates, peas are usually sown at intervals up to mid-summer or later, to provide a succession of crops until fall. This practice is not recommended under prairie conditions, as peas do not flourish during hot weather. It has been demonstrated by actual tests that a number of varieties with different dates of maturity sown on the same date are more satisfactory than one variety sown at ten-day intervals.

Peas should be sown early in the season. In an average season smooth and wrinkled sorts may be sown as soon as the ground is in condition. Should the season be extra early, a smooth-seeded variety may be sown first, followed by the wrinkled ones a week or ten days later. The seed is sown about an inch apart and two inches deep in rows spaced at thirty inches.

*Varieties.*—Early—Alaska. Second Early—Thos. Laxton, Laxton's Progress, Blue Bantam. Main Crop—Stratagem, Lincoln. Late—Quite Content. Edible Podded—Melting Sugar.

#### PEANUT (*Arachis hypogaea*)

Probably few people will accept the peanut as a garden vegetable. Reference is here made to the fact that peanuts have been grown at Morden, and mature nuts harvested on one occasion only. There is a possibility of success in an exceptionally favourable season.

The nuts are sown in hills fifteen to eighteen inches apart, and an inch or two deep, or just deep enough to rest in moist soil, when the ground is warm. They are dropped five or six to a hill and thinned to three plants. Chances for success are much enhanced by starting the nuts inside in four-inch pots and transplanting them to the field in late May.

The peanut plant will prove an interesting plant in the garden. The golden flower puts forth a shoot, which grows downward and into the ground where it expands and develops the nut.

Greater success is possible with the Spanish than the Virginian type.



### PEPPER (*Capsicum annuum*)

The peppers are related to the tomato, potato, and eggplant. As with the last named, the seed is slow in germinating and its cultivation is similar. It is a little hardier than eggplant, but climatic conditions favourable to one will suit the other.

Although the specific name, *annuum*, would mark it as an annual plant it apparently is biennial or perennial in tropical climes. It is probably a native of Brazil, and was unknown in Europe prior to the discovery of America.

There is a wide variation in peppers, especially in the form of the fruits, and although they are generally called red peppers there are both yellow and black sorts.

For garden purposes they are divided into two groups, sweet and hot peppers. The first named is the more important in cooler climates, and can be grown to a limited extent in prairie gardens. It appears to be in greater demand in a green rather than a red state, as is evidenced by the quantity displayed in stores during the summer months. These are known as bell or bull nose peppers, and varieties of these which have given fair returns at Morden are Harris' Earliest, Ruby King and Lowdens Hamilton Market. The first is the most reliable.

The name pimento often crops up in pepper discussion with various interpretations of its meaning. It refers to a thick-fleshed, mild form of Spanish pepper.

The hot pepper group are represented by such varieties as Red Chile and Long Red Cayenne. These take a longer season to ripen and are generally still quite green when frosts occur at Morden. A few fruits will ripen if the plants are dug and hung up in a warm room. They are used for pickles and certain sauces.

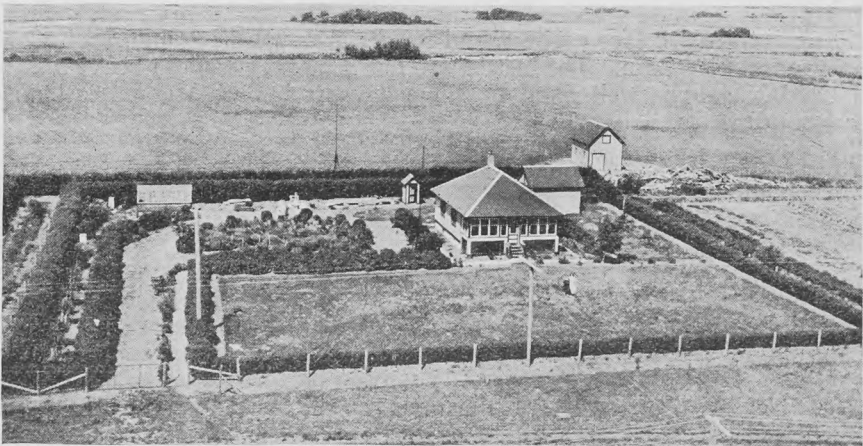


Figure 10. Sheltered garden in snowtrap area.

### POTATO (*Solanum tuberosum*)

The potato is not only the crop of first value among home-grown vegetables but is one of the most important of the world's commercial crops. Over thirty million acres are planted annually. The subject receives exhaustive treatment in Dominion of Canada Department of Agriculture, Farmers' Bulletin 3, The Potato in Canada, by T. F. Ritchie, and readers are directed thereto. A few general notes only are here given.

Disease-free seed stock is obtained. For early crop, a number of two- to six-ounce tubers are placed, side by side, blossom end up, in trays or on a shelf in a moderately lighted room, about six weeks prior to planting time. Heavier

yields will result if tubers are sprouted in moist sand rather than bare. Strong, purplish sprouts develop and these tubers will usually advance harvesting about two weeks and increase the yield. They are set, sprout end up, in a furrow the first week in May, about a foot apart, and covered with two inches of moist top soil. Shallow planting hastens development. If frost damage looks probable a layer of earth may be pulled up over the young plants.

The main crop is planted from May 10 to 24. Tubers are cut to chunky shape,  $1\frac{1}{2}$  to 2 ounces in size, and carrying one or more eyes or bud clusters. Cutting should be immediately before planting to avoid drying. In absence of a planting machine, furrows are opened with a plough and tubers placed singly 12 to 15 inches apart. These are covered with about four inches of soil with a plough or scuffer. They may be planted with an ordinary hoe. Irish Cobbler which tends, in moist years, to oversize with hollow centres is set closer in the row than other varieties. Leaves will appear above ground from one to three weeks according to soil heat.

If scab be present it will be well to soak the potatoes before cutting, in a disinfection liquid, 4 ounces of corrosive sublimate to 30 gallons of water for  $1\frac{1}{2}$  hours.

Cultivation is with harrow-tooth scuffer and commences as soon as plants show through the soil. When tops are about eight inches high soil is worked towards the plants to ensure a good cover over the tubers. Otherwise no "hilling up" is done. All weeds can be kept down.

Tuber formation is active from the time blossoming begins and from then on, irrigation should be ample to supply plenty of moisture to the soil.

Sprouted potatoes will be ready for harvest the first of July. Main crop will be harvested in late September. Tubers for storage will be hardened off for ten days or more in a conic pile covered with straw and earth. Tubers should be protected from exposure to the sun, whereby they be greened and made bitter.

*Varieties.*—Warba for earliest, and for main crop Early Ohio, Irish Cobbler, Chippewa and Katahdin. The last is late but does very well on heavy Red river soil. Gold Nugget is well liked by some growers but at Morden it tended to suffer from diseases.

#### PUMPKIN (*Cucurbito pepo*)

The pumpkin was probably grown by the Indians before the white man inhabited America but its nativity is in doubt.

Where it is produced on a large scale, it will probably be for cattle feed. Recently it has been in demand by the canning factories. However, varieties of squash are available to supply every culinary use to which pumpkins are put, and in many gardens have completely replaced pumpkins.

The pumpkin and squash are near akin and some squash are often grown as pumpkin. Of the many varieties of pumpkin listed by seedsmen, Connecticut Field and Sweet Sugar or Sugar Pie are the only true pumpkins. Mammoth Chili and Large Cheese are types of squash.

For the small garden the pumpkin is a rather large plant, and may not find accommodation. Sometimes a plant or two may be planted in the corn patch. Where there is ample room, the seed is sown in hills spaced eight feet apart each way. Seven to nine seeds dropped to the hill are afterwards thinned to three plants in each. The time to sow is when danger of frost is past, about May 20 is considered a safe date.

Pumpkin fruits are easily frozen and should be harvested before frosts are expected. They may be left in the field to harden for a time if piled up and well covered at night.

A shelf in a warm cellar or a warm attic room will provide storage requirements for pumpkins. A cold cellar is not suitable.

Sweet Sugar is the variety recommended for pies.

### RADISH (*Raphanus sativus*)

The radish is a member of the mustard family and is related to cabbage and turnip. Its cultivation is recorded in very ancient times. It is a cool, and a short season crop, being particularly impatient of hot and dry weather.

Radishes are always appreciated in early spring and are important as a home garden crop. Good quality radishes can only be grown on rich soil as they must be grown quickly. They should be ready for use in twenty-five to thirty days from the time of sowing. Those plants which are tardy in producing swollen roots are generally worthless or poor in quality.

The seed should be sown in shallow drills, and dropped thin enough so that when the seedlings appear they will stand well clear of each other. Thinning the young plants should be avoided if possible. The rows should be made fifteen inches apart, or single rows may be sown between wide spaced subjects which are sown early and at the same time. Spinach, carrots, peas and beets will allow time for radish to be gathered before they need the full spacing provided.

Two spring sowings may be made, one as soon as the land can be worked and another two weeks later. A fall sowing in September should only be considered when there has been an adequate rainfall.

Varieties Saxa, Scarlet Globe and Coopers Sparkler are red sorts. White Icicle is long rooted and white, and is a few days later than the red turnip varieties. White Strassburg is sometimes called a summer radish. It is much later in maturity than those mentioned above and will remain in good condition into the hot weather. It grows comparatively large and coarse.

Winter Radish is a large variety of the common radish and is usually sown late in July for winter use. It is stored like other root vegetables.

*Varieties.*—Black Spanish and China Rose.

### RHUBARB (*Rheum rhaponticum*)

Rhubarb or pie plant is a native of Siberia and a member of the buckwheat family. It is a very popular and valuable plant for the prairie garden because of its early production of fleshy leaf stalks which make excellent material for pies and sauce.

The upland soils and climate of western Canada appear to be naturally favourable to the plant, and good rhubarb is obtainable in most districts. This fact, however, will not justify neglect or abuse. Maintenance of health and vigour will depend on generous treatment of the plants.

Rhubarb enjoys a rich deep soil, and anything that can be done to improve this will be worthwhile. Deep ploughing and subsoiling with generous supplies of barnyard manure will be of immense benefit. The land should be prepared in the fall before planting.

The position for the rhubarb patch should be one where water will not lie in the spring so that growth may be early.

Rhubarb may be started from seed or by division of the roots. Seed should be sown in a nursery row in early spring and the young plants transferred to their permanent positions in the fall or early the following spring. Rhubarb does not come true to type from seed and there will be many worthless plants appear. It also takes a year longer to reach the productive stage.

The plantation is generally started by planting divisions of the roots of an old plant. Each portion must have a crown or an eye. These are set out in rows at four feet apart, and spaced at three or four feet in the row. The crown should be placed level with the ground or very lightly covered with soil. Planting may be done in late September or left until spring. A covering of straw or strawy manure at freeze-up will be a safeguard for the new plant against unusual winter conditions.

No harvesting of stalks should be permitted the first year of planting, and all work done should be directed towards promoting healthy and vigorous growth

by means of clean cultivation. If one must have rhubarb, it would be advisable to plant an extra row among the annual vegetables where stalks could be gathered regardless of effect, and where they would have to be ploughed up in the fall.

Harvesting of stalks may commence the second year from planting, but should be for a short period only, and carefully carried out. A stalk or two gathered from a few plants is better than many from one plant. A plant should always appear to be well furnished with stalks and leaves. Seed stalks must be cut off as they appear.

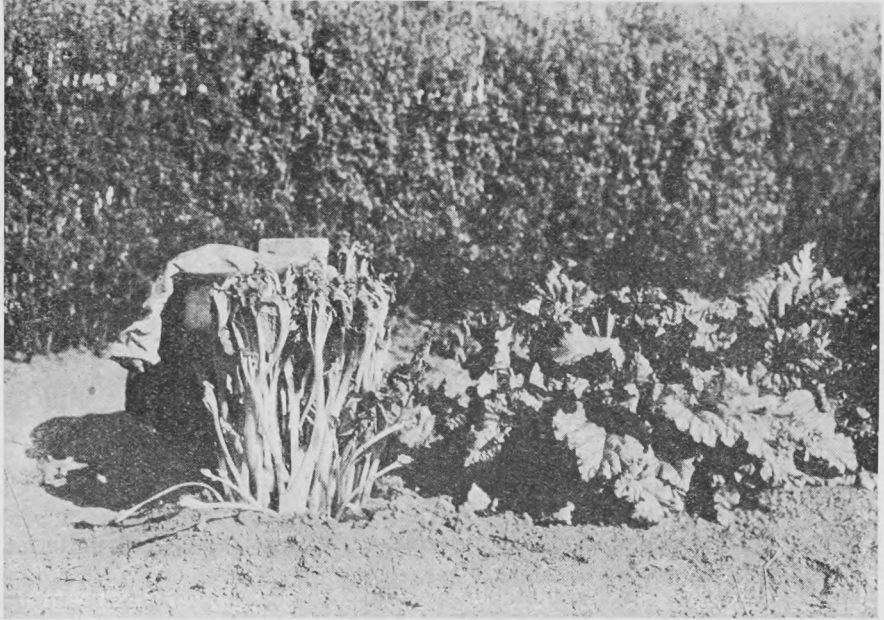


Figure 11. Spring forcing of rhubarb with an apple barrel at Morden.

The season for rhubarb should be confined to about two months. About the time that the small fruits such as gooseberries and currants are ripening is a good time to quit. This schedule will allow the plants to build up energy for early production the following year. To assist the plantation in this respect a generous covering of barnyard manure applied when harvesting has ceased will be good practice when the plants have reached four or five years of age.

*Varieties.*—Macdonald is the most productive. Ruby has better colour and requires less sugar in cooking. New varieties which may challenge the dominant commercial position of Macdonald and Ruby are Canada Red, Shortcake and Coulter.

#### SALSIFY OR VEGETABLE-OYSTER (*Trapopogon porrifolius*)

Salsify is a member of the sunflower family, and appears to be of minor importance in Canada. It is grown for its roots which bear a slight resemblance to a parsnip, but are much smaller. The leaves and root exude a milky juice when broken or cut. The plant is quite hardy but needs to be taken up and stored for winter use. It is grown and cooked in a manner similar to carrots or parsnips.

*Variety.*—Mammoth Sandwich Island.



*Scorzonera* (*S. hispanica*) is known as black salsify. The roots are long and black and must be soaked in water to remove the bitterness before being boiled.

#### SEAKALE (*Cramba maritima*)

Seakale is a hardy perennial plant belonging to the mustard family and is a native of western Europe. It is grown for its young leaves and shoots, when blanched by forcing. It is not used in its green or natural state.

Seakale may be started from seed or root cuttings. When seeds are used they are sown in nursery rows, drawn an inch deep and eighteen or more inches apart. The seeds should be dropped a few inches apart so that thinning the plants will not be necessary. Clean cultivation will provide good planting stock the first year. The following spring the plants are taken up and planted in their permanent positions with the perennial vegetables. The soil should have been prepared as for rhubarb, and be well drained. They are set out two feet apart in rows spaced at three feet, and again given clean cultivation to promote vigorous plants. They should be ready for forcing the following spring, that is, two years from seed sowing.

Preparations for forcing should be started immediately the ground is surface dry in the spring and before growth begins. This is done by placing inverted large flower pots or boxes over the crowns and surrounding them with strawy manure or leaves. The covering should not be deep enough to promote heat, but only sufficient to ensure darkness. Sometimes a ridge of very sandy soil to a depth of fifteen to eighteen inches is thrown up over the crowns. The seakale is ready for cutting immediately growth appears through the soil or when six to nine inches high in the boxes.

When all the growths have been cut, the soil is spread between the rows, or the boxes and other material removed. New crowns will be formed and clean cultivation will promote vigorous growth and strong crowns for the following season.

Roots for winter cellar forcing are obtained by a system of annual production of what may be called forcing roots. For this cuttings are used which may be taken from a few of the old plants which could be lifted. The cuttings are made from the small side roots which proceed from the main or centre root. The pieces selected for cuttings should be about the thickness of a lead pencil or larger and cut to six or seven inches in length. The thick roots may then be replanted in their former position. The cuttings are planted in early spring in rows two and a half feet apart and one foot in the row. Close attention is needed to keep the thick end of the cutting uppermost and near the surface. It will soon form a crown and produce leaves. This planting may be made in the annual vegetable garden where it can be conveniently be kept clean and cultivated.

The roots are harvested in the fall and the small roots trimmed off. They are then placed upright an inch or two apart with the crowns slightly above the surface in boxes of soil and kept in a cool place until needed for forcing.

The small roots are reserved for planting and producing the crop of the following year. They are prepared by cutting them to a length of six or seven inches, making a straight cut across the thicker end and slanting cut at the tapered end. These are tied in bundles of twenty-five and also placed in boxes of soil or sand, and kept in a cool cellar until planting time.

#### SHALLOT (*Allium ascalonicum*)

This is a perennial herb of the onion family, and is probably of Asiatic origin. It produces a cluster of small pointed bulbs, which somewhat resemble garlic. They are not surrounded by a thin membrane however. The cultivation and manner of harvesting are the same as advised for garlic.

Shallots have a mild flavour and are used principally for seasoning. The young leaves are also used to some extent.

Much of the stock grown as shallots is really another form of onion known as multiplier. The multiplier has a compound bulb which when planted segregates into a number of bulbs. It appears to be a form of *Allium cepa*.

#### SOYBEANS (*Soja max*)

This oriental legume was grown as a minor field crop in Manitoba for nearly two decades before varieties suitable for table use introduced by the United States Department of Agriculture were grown here. Now there are varieties esteemed as green shelled beans and others which, when cured as dry beans, cook tender and with appealing flavour.

The soybean is exacting as to its growing conditions. There are thousands of varieties in Manchuria and in the United States. One of the present tasks is to select or develop strains for table use which are early in maturing, pleasing in quality, and which are dependably productive in prairie gardens.

The soybean is rich in fat, protein and vitamin content of forms A, B, and G. It is a good source of calcium, phosphorus, and iron, and contains some iodine. It is used by the cook in green form as a green vegetable, in salads, and canned, and in dried form baked, boiled, salted, as a coffee substitute, in sauces, as cooking oils, and in numerous other nutritious ways. Chinese writings as distant as 2838 B.C. mention its value.

There is some difficulty in shelling green beans. Procedure is to pick when about full size but while still green and full of sap, boil in the pods for about five minutes, shell, and cook by boiling or steaming in water which has been moderately salted.

Dry soybeans are soaked overnight then cooked as are ordinary dry beans. Length of cooking time varies considerably with the variety used.

In culture, soybeans resemble snapbeans in being frost tender in autumn. They differ in being considerably tolerant to spring frosts. As they require a comparatively long growing season it has been proved desirable to have them sown at Morden about May 10 and not later than May 15. Variety testing is under way. The two already available in the trade, and which have been approved on performance are Agate and Sioux. A number of additional sorts will be offered by the trade shortly.

#### SPINACH (*Spinacia oleracea*)

Spinach is an annual dioecious plant which belongs to the goosefoot family and is related to the beet. It is a native of Asia and of comparatively recent domestication. There were formerly two forms of spinach recognized, the smooth and prickly seeded. The latter was almost exclusively used for fall and the former for spring sowing. Little attention is paid to these and other characters possessed by these types at the present time. Growers and plant breeders are more concerned with leaf characters, earliness and tardiness in producing seed stalks.

Spinach is essentially a cool season crop, it delights in a rich soil and cool moist weather. The seed is sown as soon as the land is workable in spring. The drills are drawn an inch deep and the rows spaced thirty inches apart. The young plants may be thinned gradually, to stand six inches apart, and the thinnings may be used as greens.

Spinach is usually harvested by cutting the entire plant when it has five or six large leaves, but the home gardener may find it more convenient and economical to gather the large leaves at intervals up to the time when the flower stalk appears when the whole plant should be cut.

*Varieties.*—King of Denmark, Long Standing, Bloomsdale, Juliana.

### SPINACH, NEW ZEALAND (*Tetragonia expansa*)

This plant belongs to the family Mesembryacea, and is not even remotely related to Spinacia. It is found growing wild in Australia and New Zealand.

The plant is of a spreading character and is valued for the young leaves and tender growth tips which are produced throughout the summer months after the true spinach is over. There is only a slight resemblance to spinach in flavour, but it makes excellent "greens." The plant is tender to frost, but the seed may be sown at the same time as ordinary spinach. They are rather slow to germinate and generally escape late frost. The large seeds are sown a few inches apart in rows thirty inches apart and afterwards thinned to stand one foot apart.

### SWEET-POTATO (*Ipomoea batatas*)

The sweet-potato is a member of the morning glory family, and is a tropical plant which requires warm moist conditions for maximum development. It is not recommended here as a general crop, but more as a novelty to those who seek the unusual.

Sweet-potatoes of a size comparable with those offered for sale in stores and of good quality, have been produced at Morden, by following the method here described.

A pound or two of ordinary commercial sweet-potatoes were purchased from the fruit store, in early May. These were placed in flats and covered with sandy soil to a depth of two inches, and watered. The flats were placed in a mild hotbed to induce the potatoes to sprout. In about three weeks the sprouts appeared and were detached from the roots a few days afterwards when four or five inches high and potted up in small pots of sandy soil. They were returned to the hotbed and afterwards hardened off in a cold frame.

Planting to the field was made about June 8 in a position prepared by throwing up the soil to form a flat rounded mound elevated a few inches above the surrounding surface, and three feet wide.

The plants were set two feet apart in a single row, and kept clean of weeds.

The roots were harvested when the leaves were first blackened by frost, well dried in the sun for two days and used for food soon afterwards. Local sweet-potatoes should be used soon after harvesting. They must be specially prepared for storage.

### SQUASH (*Cucurbita maxima*)

The differentiation of squash from pumpkin is very uncertain. For garden purposes squash are divided into two groups, namely, winter (*C. maxima*) and summer squash (*C. moschata*). Some authorities would have the pumpkins (*C. pepo*) include the summer squash (*C. moschata*). This would take the vegetable marrow and crookneck squash into the pumpkin group. To the gardener, an attempted change would probably be unwelcome because of established custom. The main distinguishing character between the various species are those concerning the stem of the fruit. In pumpkin (*C. pepo*) the stem is five angled and not expanded next to fruit. In summer squash (*C. moschata*) the stem is neither angled nor fleshy but much expanded at attachment to fruit, while the winter squash (*C. maxima*) stem is neither angled nor expanded but fleshy and enlarged, becoming rather spongy when mature.

To seed growers and plant breeders the species are important, since varieties of the same species cross very readily, but those belonging to different species, contrary to popular belief, practically never cross in nature. Questions often arise regarding the above mentioned subject, and the facts are as follows:

- (1) Cucumbers do not cross with muskmelons, watermelons, pumpkins and squash.

- (2) Watermelons cross with citrons but not with cucumbers, muskmelons, squash or pumpkins.
- (3) Pumpkins (*C. pepo*) do not cross with squash (*C. maxima*) nor with cucumbers, muskmelons or watermelons.
- (4) Pumpkins (*C. moschata*) have been crossed with pumpkins (*C. pepo*) and squash (*C. maxima*) artificially but only with difficulty, and investigators state that there is very little danger of natural crossing under field conditions. *C. moschata* does not cross with cucumbers, muskmelons or watermelons.
- (5) Squashes (*C. maxima*) do not cross with pumpkins (*C. pepo*), cucumbers or muskmelons or watermelons.

The culture of squash follows closely that advised for pumpkin except that the bush types are planted four feet apart in rows six feet or more apart.

The winter varieties such as Hubbard are stored in the same way, but summer squash are generally used in an immature state. The Coccozelle and English vegetable marrow are better in quality when quite young, and may be used even before seeds have formed. These have passed the quality stage when the skin resists the pressure of the finger nail. They are also much inferior to winter squash when mature.

*Varieties.*—(Winter) Hubbard, Golden Hubbard, Arikara, Winnebago, Boston Marrow and Buttercup. Acorn, Table Queen or Des Moines is a small deeply ribbed sort about six inches long and weighing  $1\frac{1}{2}$  to 2 pounds. They are often called individual squashes.

(Summer) English Vegetable Marrow, Coccozelle, White Bush Scalloped, and Summer Crookneck.

SUNBERRY, SOLANBERRY, GARDEN HUCKLEBERRY OR WONDERBERRY (*Solanum spp.*)

These subjects belong to the tomato family. Sown in, or transplanted to the garden, they produce plants which are enormously productive of small glossy black berries. The berries may be used in pies or as preserves. As

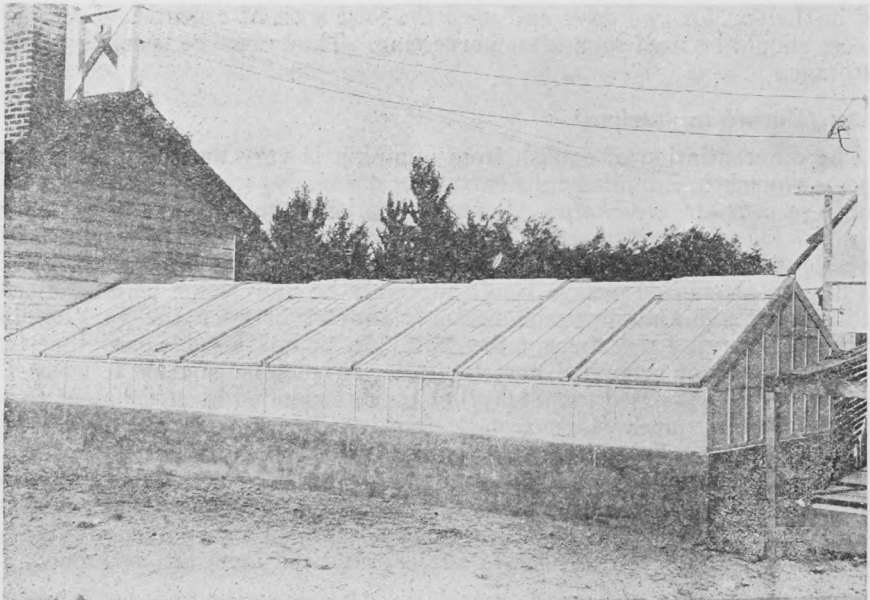


Figure 12.—Small farm greenhouse,  $10\frac{1}{2}$  feet by 25 feet. Frame sash for roof.  
(Morden)



grown at Morden, they have not won favour. The cooked fruit is excessively juicy and the seeds are noticeable. Some growers consider them as possible substitutes for blueberries.

#### TOMATOES (*Lycopersicum esculentum*)

The tomato is a popular and important home garden vegetable on the prairies. It is a native of South America where it was eaten by the Indians before the time of Columbus, and is still to be found growing wild. The plant appears to have been grown in Europe prior to 1600, long before it came into general use in America. Early attempts to introduce it as a food plant were viewed with suspicion and this prejudice persisted until about the middle of the nineteenth century after which it made rapid progress in popular esteem.

The tomato has undergone considerable modification as a result of cultivation. The most important development, from a prairie garden viewpoint, is that of early fruiting. This factor has extended its area of possible cultivation to the most northern limits of the prairies.

Plant breeders are still working on this early fruiting character and the introduction, three years ago, of the variety Farthest North by Professor Yeager, late of the University of North Dakota, may have far reaching possibilities. This variety when sown in the open in early June will produce small ripe fruit in mid-August.

The tomato is a warm weather plant tender to frost and enjoys a rich sandy loam soil that will absorb the sun's heat in spring. It needs a fairly long frost-free period for successful growth, so that plants must be raised early indoors to be planted when conditions are favourable outdoors.

The seed should be sown from March 24 to April 7, depending on facilities available for growing the plants. If a greenhouse or hotbed is to be used, the last named date will allow ample time to produce the best type of plant for setting out. For the dwelling house window the earlier date is better. Well drained pots or shallow boxes of sandy soil are prepared for the seeds which are sown thinly and covered with one-quarter inch of soil. They are then watered and placed in greenhouse, hotbed, or warm window, and shaded with paper from bright sunshine. A temperature of 65 to 70 degrees should be maintained if possible.

When the seedlings are two inches high and showing the first true leaf they should be transplanted three or four inches apart into other shallow boxes or flats, and kept warm for another two weeks or until they are growing freely, when they should be moved to a sash covered cold frame. From this time until planting time, the plants should be grown fairly cool, with ample ventilation whenever weather permits. Dwelling house plants should be put out in warm sheltered positions on calm days and moved indoors at night.

In place of the shallow boxes, plant bands or tin cans are often used. One plant in each band, or can, ensures less root disturbance in transplanting.

Seeds are often sown too early in dwelling houses, resulting in long drawn, weak, starved looking plants, which take a long time to get established when planted out. A plant six to eight inches high, sturdy and short jointed with deep green leaves is the best type of plant for setting out.

The plants should be set out during the first week in June, at distances which may vary with the variety or method of cultivation. For the large garden four feet apart each way will be sufficient for the more robust growing kinds, while three feet apart will accommodate the self-pruning or determinate growth varieties.

In the small garden tomatoes are often staked. The method has little to commend it generally, except that a few earlier fruits may be gathered. The total possible yield is much reduced and sun scalded fruits are more numerous. Sometimes plants are pruned and staked after considerable growth has been made. No benefits are to be gained by this procedure. Stakes should

be placed in position before planting, and the plant's growth confined to one stem. No leaves are cut off and there is no real pruning done. The only growths removed are the lateral shoots which proceed from the axils of the leaves, and these should be rubbed out when quite small, and regularly every day or two. The best distance for staked tomatoes is eighteen inches by three feet. Self pruning types are not staked.

Varieties.—Abel, Penn. State, Harkness, Pritchard.

Self pruning varieties—Bison, Fargo.

Fancy or small fruiting—Fargo Yellow Pear, Yellow Plum, Red Pear.

Novelties—Farthest North, Redskin.

### HUSK TOMATO (*Physalis spp.*)

The husk tomato is grown to a small extent in dry regions, where it is used mostly for preserves. It is a decumbent plant and produces a round, yellow or purple fruit inside a thin husk. There are native species which are known as ground cherries. The larger, sweet types have been rather late in maturing. The plants are handled in the same manner as tomatoes.

### TURNIP (*Brassica rapa*)

The true turnip is not grown to any extent in prairie gardens. Young turnips at their best are a really good early vegetable, but on prairie soils they are extremely bitter when cooked, and are in general disfavour.

Where they can be grown, the seeds should be sown in early spring an inch deep in drills drawn two feet apart and the plants thinned to stand two inches apart. They should be used when quite small, or when about three inches in diameter.

The variety Extra Milan is the most likely to succeed. It should be ready for use in six weeks from sowing.

An exceptionally cool season with ample rainfall might be productive of good quality turnips.

The name turnip is more generally applied to the rutabaga.

### TURNIP, RUTABAGA OR SWEDE (*Brassica napobrassica*)

The rutabaga or swede turnip is cultivated and appreciated more than the true turnip almost everywhere. In general appearance it resembles the turnip but has a denser, larger root. The leaves are smooth with a bluish bloom whereas those of the turnip are hairy and green. It needs a full season to reach maturity. Rutabagas enjoy a cool season, ample rainfall, and a rich rather retentive soil. The seed should be sown in early May to enable the plants to become well established before the heat of summer overtakes them. Root development takes place in the late summer and fall.

The seed rows are drawn two and one half feet apart and the plants thinned to one foot apart.

They are improved by light frost, but should be harvested before severe freezing is expected, and stored similar to potatoes.

The bitter taste of prairie turnips varies in the different sorts. Canadian Gem is remarkably mild in this respect compared with other varieties.

### VEGETABLE MARROW (*Cucurbita pepo ovifera*)

Vegetable marrows are discussed under squash where they are grouped with the summer squash. They appear to be of a relative unimportance and are usually grown to the ripened stage. In this condition they are of little use as a table vegetable, as the flesh is then granular and stringy. When cut young and tender they possess a delicate flavour when properly served.

The bush sorts mentioned under squash are suitable for the small garden.

**Herbs.**—The term herb, as used here, refers to those plants of occasional culinary value which are included in the home garden for the distinctive aromatic properties they possess. They are used to flavour salads, soups,

warmed over dishes, dressings, poultry stuffings, sauces, drinks and as relish for meats and fish. In most cases it is the leaves and young stems that are employed, in some it is the stalks, flowers or seeds. A number of the herbs retain their potency in large degree when dried and stored for winter use. Others are used only in fresh state. European cooks employ aromatic herbs in their cooking much more widely than Canadian housekeepers. However, the popularity of herbs is extending in prairie gardens, and mention is made of fifteen. The list might readily be made three times as long.

**BALM OR LEMON BALM**, (*Melissa officinalis*)—leaves and young shoots are used to flavour drinks, soups and salads. Dried leaves are used in pot-pourris.

**BORAGE** (*Borago officinalis*)—flowers are used to flavour cold drinks, the young leaves in mixed salads. This is one of the four cardinal flowers of the ancients. Borage bloom is valuable to honey bees.

**BASIL, SWEET** (*Ocimum basilicum*)—leaves to flavour hot and cold dishes, such as those containing tomatoes, and in bean soup.

**CHIVES** (*Allium schoenoprasum*)—green leaves used to season fried potatoes, soups and many other dishes. Chives are mild flavoured members of the onion family. They are properly placed in the perennial portion of the garden. Increase is by root divisions in early spring.

**CRESS, GARDEN OR PEPPERGRASS** (*Lepidium sativum*)—leaves used in salads, sandwiches and as garnish. Sow seed in open ground in earliest spring and make several successive sowings at ten-day intervals. Crowns will send forth new growth if leaves are nipped off carefully.

**DILL** (*Anethum graveolens*)—young leaves, stems and seeds for flavouring pickles and seasoning other dishes. For dill pickles, seed is sown in the open about two months before cucumber harvest.

**FENNEL, FLORENCE** (*Foeniculum vulgare* var. *dulce*.)—stalks are blanched as with celery and eaten boiled or in natural state.

**FENNEL, SWEET** (*Foeniculum vulgare* var. *piperitum*)—sweet tasting leaves used as garnish, in salads, soups and fish dishes.

**MARJORAM, SWEET KNOTTED** (*Origanum majorana*)—leaves, branch tips and flowering tops are used in sauces for meats, and in dressings. Plants may be dried for winter use.

**PARSLEY** (*Petroselinum hortense*)—leaves for garnishing and for flavouring salads and cooked dishes. This is the most widely used garden herb. It may be sown in the garden in April and May or transplanted from flats in late May. It is important that ample spacing be allowed each plant from seedling stage on. Parsley is an outstanding source of some vitamins.

**SAGE** (*Salvia officinalis*)—leaves for flavouring meat, dressings, poultry stuffings and cooking. This member of the mint family is perennial but is usually grown here as an annual, planting the seed inside in March and transplanting to the garden in May. Plants are dried for future use.

**SAVORY, SUMMER** (*Satureia hortensis*)—leaves and flowering branches for flavouring salads, sauces, dressing, stews and cooked vegetables. For storing, plants are cut as blossoming begins.

**SPEARMINT** (*Mentha spicata*, or *M. viridis*)—leaves and young shoots for flavouring relishes for meat dishes, wine cups, soups and jellies. Other common names are lamb mint, heartmint, and garden mint. Spearmint is a comparatively hardy perennial and is well placed in a corner of the perennial garden. Propagation is usually by root division.

THYME, COMMON (*Thymus vulgaris*)—leaves and young shoots, green or dried, for poultry stuffings, and general seasoning of meat, gravies and soups. Common thyme may be grown as an annual, seeded early inside and later transplanted.

THYME, LEMON, MOTHER-OF-THYME OR CREEPING THYME (*Thymus serpyllum*)—leaves and young shoots for flavouring. This form is perennial and may properly be considered as a small creeping shrub. It is increased from divisions or cuttings. Among the garden perennials is the place to set it.

The culture of garden herbs is not exacting. Except where otherwise noted above, the herbs listed are grown from seed. As these are mostly small and slow in germinating, it is desirable to sow in flats or seed pans inside, or in a hotbed, then prick out to other flats and later transplant to the deeply tilled garden when weather conditions are suitable. A sunny location is favourable. Fair to good results may be gained by outside seeding in early spring. Once started into growth, the plants are good doers and require but little care. Some such as dill, may become weedy if allowed to self seed and blow about the garden. In their case, harvesting should take place before seed is dispersed.

Specialists advocate harvesting for leaf storage on a dry sunny day when the plants are in full growth, charged with sap, and about to flower. Plants are cut off near the ground, tied in bunches and hung to dry in a cool, airy dust-free room. Leaves are stripped off and final drying made in paper-lined flats. When thoroughly dry they are put in jars, covered and labelled. Among those herbs so treated are balm, sweet basil, celery, dill, fennel, mint, parsley, sage and thyme.

Some herbs deserve fall potting so that they can be grown among the house plants in winter. Examples are balm, chives, spearmint and parsley. They add variety to the winter window garden and provide herbs for the cook.

### Progress

The garden planned for next spring has wide advantages over the best attainable in 1920. Farmsteads are now more sheltered and this feature alone is of inestimable advantage. New machinery has removed much of the hand labour which permitted earlier gardeners to complain of "drudgery" in vegetable growing. The tractor may be used to plant and cultivate the shelterbelt and to pull all tillage implements. Improved hand tools and seed drills are available. Methods of combating insects and diseases have developed in greater ease and efficiency. Commercial fertilizers give a jump to germination and a stimulus to plant development. Thousands of prairie farmers are establishing dugouts from which they can use water for garden irrigation. This permits success in the face of the most general prairie crop handicap,—drought conditions.

There is arresting information in United States Department of Agriculture, Miscellaneous Publication No. 237,—Food Plants of the North American Indians by Elias Yanovsky. In that 84-page bulletin, a total of 1,112 species of plants, embracing 444 plant genera and 120 plant families are mentioned. Prairie Indians in some instances had gardens long before they knew of white men. Others, although not tillers of the soil, were grateful for the offerings of Nature and treated with reverence certain trees, shrubs, vines and herbaceous plants. A few of their many herbaceous foods were Indian breadfruit or Indian turnip, common bean, sunflowers, Jerusalem artichoke, prairie flax, Indian corn, pumpkin, squash, soapweed yucca, orange-cup lily, and wild onions.

Since 1920 attention has been paid to vegetable strains being grown in dry inland areas of other continents where older civilizations have wrought benefits by selection of specially adapted strains, through the centuries. From Russia, Poland, India, China, Manchuria, Siberia, Africa, and Australia, have come seeds of varieties that have withstood drought conditions at home. Already a



number of these introductions are recognized in catalogues of commercial seedsmen. Experimental Stations, commercial seed firms, and plant breeders are hybridizing and crossing to further improve the general characters of the leading garden crops. New varieties of value to the prairie gardener are showing up each year and in increasing numbers. The future of prairie vegetable growing appears more and more attractive.

### **Thoughts on Dry Land Prairie Gardening**

Shelter is exceedingly important. A farmer's garden on the unsheltered open prairie may be 90 per cent failure while his neighbour within thick tree shelter may at the same time experience almost 90 per cent success with his vegetables.

The value of snowtrap snowdrifts thawing so that their waters trickle across the garden patch in March and April is vital.

The nearly all importance of soil moisture is experienced in dry land gardening.

Summer-fallow land where reserves of soil moisture are stored is auspicious for vegetable growing.

Wide spacing of rows and of plants in the row allows for more moisture per plant.

Weeds are garden enemy Number One, and should be given no quarter at any time. In earliest seedling stage they are eliminated with greatest economy.

Perennial crops should be cultivated shortly after the snows depart.

Early ordering of seeds and early sowing is good business.

Tired gardens are inferior assets. Hearten the soil with a lavish feeding of rotted manure and moderate applications of commercial fertilizer. Irrigate in times of need if feasible.

Gamble somewhat on the weather. Sow melons, cucumbers and beans a week or two earlier than advocated, and sow a second row a few inches to one side of the first row at the approved sure-thing date. If your first venture wins, you profit in an earlier and longer harvest season.

Hoe and cultivate after rains to break down surface crusts, fill cracks and create a dust mulch to blanket down soil moisture.

Thin plants promptly. Complete thinning when soil insects have moved past. A crowded seedling row means root strangulation and mutual plant starvation. Sulplus plants are virtually weeds,—or robber plants out of place.

Fine seed beds are essential for efficient starting of small seeds.

Seeds should be sown in contact with moist soil.

Seed trenches should be open a minimum length of time, avoiding unnecessary evaporation of moisture.

Keep hotbeds busy throughout the growing season.

Cultivation must not be deep if destructive mutilation of plant feeder roots is to be avoided.

Home grown transplant stock is likely to give results superior to those from shipped-in plants.

Depend upon sowing several varieties of different seasons of maturing rather than resorting to successive sowings to prolong harvesting.

Visit and confer with the nearest Experimental Station as to newer improved varieties, treatment against pests, and consideration of general problems.

Have a large garden but only plant such a portion as may be tended adequately.

Arrange the vegetable garden as a family project in which every member will be an active, keen, responsive partner.

## Vegetable Crops

1939

Names according to

- (1) "Standardized Plant Names" 1923.
- (2) "The Culture of Vegetables and Flowers"—Sutton and Sons, 1936.
- (3) "Vegetable Crops"—H. C. Thompson, McGraw Hill & Co., 1923.
- (4) "Yearbook of Agriculture 1937", United States Department of Agriculture.

Artichoke, Chinese (*Stachys tuberifera*)  
 Artichoke, or Globe Artichoke (*Cynara scolymus*)  
 Artichoke, Jerusalem (*Helianthus tuberosus*)  
 Asparagus, Garden (*Asparagus officinalis*)  
 Bean, Common (*Phaseolus vulgaris*)  
 Bean Broad (*Vicia faba*)  
 Bean Lima (*Phaseolus lunatus macrocarpus*)  
 Bean Pole (*Phaseolus vulgaris*)  
 Bean Scarlet Runner (*Phaseolus coccineus*, or *P. multiflorus*)  
 Beet, Common (*Beta vulgaris*)  
 Broccoli (*Brassica oleracea botrytis*)  
 Brussels Sprouts (*Brassica oleracea gemmifera*)  
 Cabbage (*Brassica oleracea capitata*)  
 Cabbage, Chinese (*Brassica pekinensis*)  
 Carrot, Common (*Daucus carota*)  
 Cauliflower (*Brassica oleracea botrytis*)  
 Celery (*Apium graveolens*)  
 Chard, Swiss Chard, or Spinach Beet (*Beta cicla*)  
 Chicory (*Cicorium intybus*)  
 Chive (*Allium schoenoprasum*)  
 Corn, Pop (*Zea mays everta*)  
 Corn, sweet (*Zea mays rugosa*)  
 Cress, Garden (*Lepidium sativum*)  
 Cress, Water (*Radicula nasturtium—aquaticum*)  
 Cucumber (*Cucumis sativus*)  
 Cucumber, West Indian Gherkin (*Cucumis anguria*)  
 Celeriac (*Apium graveolens* var. *rapaceum*)  
 Dandelion (*Taraxacum officinale*)  
 Dock, Spinach (*Rumex* spp.)  
 Eggplant, Common (*Solanum melongena*)  
 Endive (*Cichorium endivia*)  
 Garlic (*Allium sativum*)  
 Herbs (See special section)  
 Horseradish (*Radicula armoracia*)  
 Husk Tomato (*Physalis* spp.)  
 Kale, or Borecole (*Brassica oleracea acephala*)  
 Kohlrabi (*Brassica oleracea caulorapa*)  
 Lambs-quarters (*Chenopodium album*)  
 Leek (*Allium porrum*)  
 Lettuce, Garden (*Lactuca sativa*)  
 Melon:—Muskmelon (*Cucumis melo*)  
 Melon:—Watermelon (*Citrullus vulgaris*)  
 Mushrooms (*Agaricus campestris*)  
 Okra (*Hibiscus esculentus*)  
 Onion (*Allium cepa*)  
 Onion, Welsh (*Allium fistulosum*)  
 Onion, Top (*Allium cepa bulbifera*)

Orach, Garden (*Atriplex hortensis*)  
 Parsley (*Petroselinum hortense*)  
 Parsnip (*Pastinaca sativa*)  
 Pea, Common (*Pisum sativum*)  
 Peanut (*Arachis hypogaea*)  
 Pepper (*Capsicum annuum* and *C. frutescens*)  
 Potato (*Solanum tuberosum*)  
 Pumpkin (*Cucurbita pepo*)  
 Radish (*Raphanus sativus*)  
 Rhubarb, Common (*Rheum rhaponticum*)  
 Salsify, or Vegetable-Oyster (*Tragopogon porrifolius*)  
 Seakale (*Cramba maritima*)  
 Shallot (*Allium ascalonicum*)  
 Soybean (*Soja max*)  
 Spinach (*Spinacia oleracea*)  
 Spinach, New Zealand (*Tetragonia expansa*)  
 Sweet-potato (*Ipomoea batatas*)  
 Squash (*Cucurbita maxima*)  
 Squash, Summer Crookneck (*C. pepo condens*a)  
 Sunberry, Solanberry, Garden Huckleberry or Wonderberry (*Solanum* spp.)  
 Tomato (*Lycopersicum esculentum*)  
 Turnip (*Brassica rapa*)  
 Turnip, Swede, or Rutabaga (*Brassica napobrassica*)  
 Vegetable Marrow (*Cucurbita pepo ovifera*)

#### Herbs

Balm or Lemon Balm (*Melissa officinalis*)  
 Borage (*Borago officinalis*)  
 Basil, Sweet (*Ocimum basilicum*)  
 Chives (*Allium schoenoprasum*)  
 Cress, Garden or Peppergrass (*Lepidium sativum*)  
 Dill (*Anathum graveolens*)  
 Fennel, Florence (*Foeniculum vulgare dulce*)  
 Fennel, Sweet (*Foeniculum vulgare piperitum*)  
 Marjoram, Sweet Knotted (*Origanum majorana*)  
 Parsley (*Petroselinum hortense*)  
 Sage (*Salvia officinalis*)  
 Savory, Summer (*Satureia hortensis*)  
 Spearmint (*Mentha spicata* or *M. viridis*)  
 Thyme, Common (*Thymus vulgaris*)  
 Thyme, Lemon, Mother-of-Thyme or Creeping Thyme (*Thymus serpyllum*)

